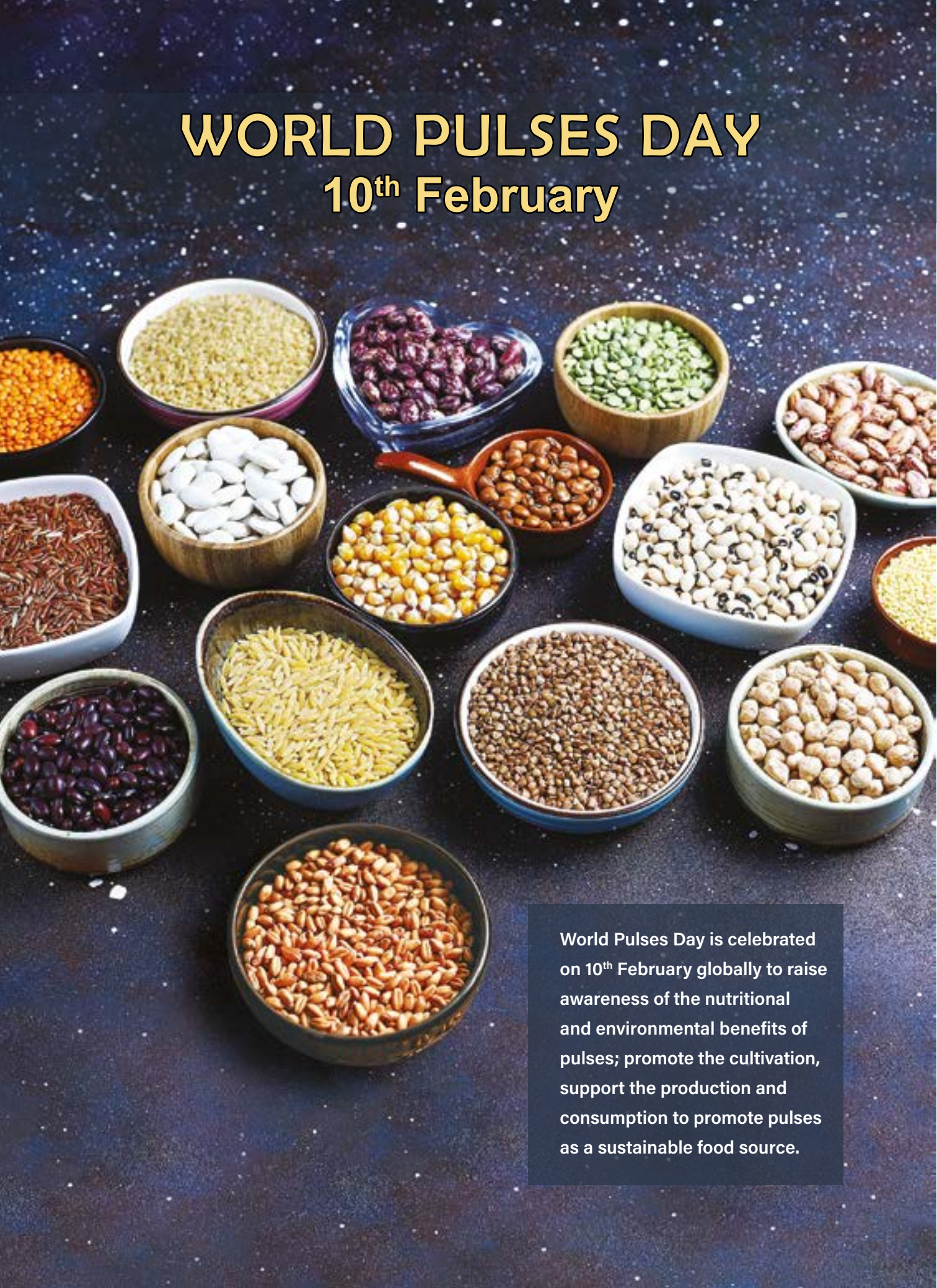
PRAJYA

MONTHLY NEWS MAGAZINE FOR CHILDREN

Volume: 04 Issue: 07 March 2025 Rs.85/-

Mahakumbh 2025

WORLD PULSES DAY
10th February



World Pulses Day is celebrated on 10th February globally to raise awareness of the nutritional and environmental benefits of pulses; promote the cultivation, support the production and consumption to promote pulses as a sustainable food source.

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FROM THE EDITOR'S DESK

"A goal without a plan is just a wish."

- Antoine de Saint-Exupéry

This is true of any action, at the simplest of levels. Consider the planning that must have gone into organising the *Maha Kumbha Mela* in Prayagraj that concluded on the day of *Mahashivaratri* recently.

Imagine the scale of operations at various levels where a mind-boggling 60+ crore people visited the place during the festival. It is more than the population of many countries put together!

What stands out is the efficiency of planning and execution of a humongous task. Organising this event has also had economic benefits providing direct and indirect employment opportunities to lakhs of people in sectors like tourism, transportation, food and hospitality.

The event also had universal appeal drawing people from across the globe. The spiritual congregation is unique and unparalleled in the world irrespective of caste and creed. Another speciality of this *Kumbh* is the rare astronomical phenomenon of alignment of 7 planets.

According to the CM's office, **"the 45-day religious festival achieved several Guinness World Records, including the largest simultaneous river clean-up, the highest number of volunteers participating in a single-site cleanliness drive, and the most participants creating handprint paintings in just eight hours."**

अक्रमेणानुपायेन कर्मारम्भो न सिध्यति।

(**Translation** - A work begun with no order and means does not succeed.)

We now know why and how this *Kumbh Mela* has been a great success.

Read, reflect and revert with your thoughts and feelings.

We look forward to your support and suggestions.

- Editorial Team

Dear Readers,

There have been requests from quite a few readers for hard copies of Prajya. We understand that quite a high percentage of our young readers keep revisiting some articles, and a handy print version within reach induces one to read more often, highlight things and make notes. This also partly contributes to students spending less screen time. The Prajya team is happy to bring to you the issue in print.

However, there are few things that we want to be careful about:

A. We don't want to print more than what is required and

B. Keep the cost of the print version (plus postage) within reasonable limits.

Please note that the access to free online e-version will continue.

So, it will greatly help us if you could fill in the details in the link provided.

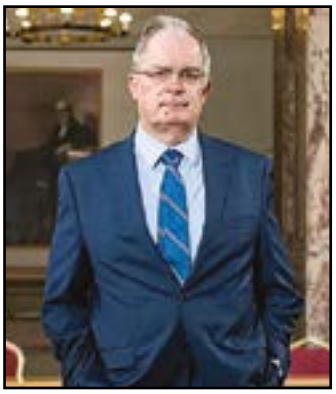
http://bit.ly/Prajya

Happy Reading !

Watch out for the Monthly Prajya Quiz online

Visit https://davchennai.org/publications/prajya-news-magazine/

Content



International Current Affairs

National Current Affairs

Shri Ramaswamy R

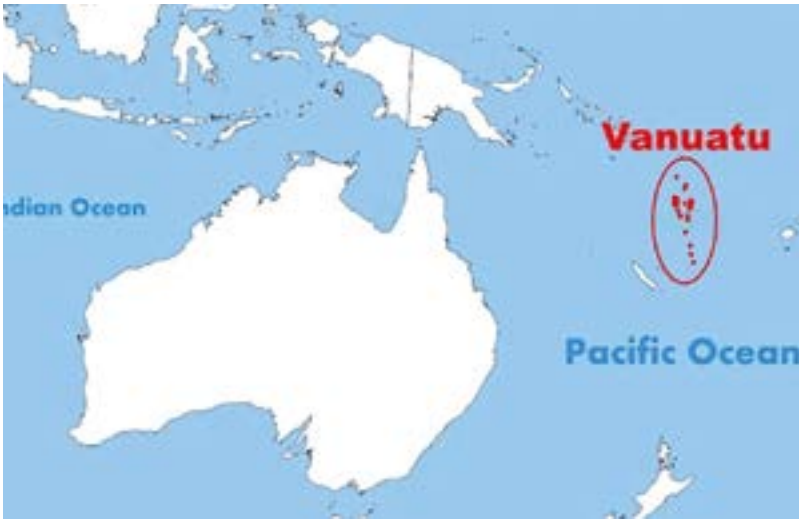
New World Leaders

Country	Area (km^2) Ranking	Population (millions)	Language	Capital	Currency (For 1 USD)	Economy (Nominal GDP GR)
Vanuatu	12,189	0.234	English, French and Bislama besides 138 indigenous languages	Port Vila	Vatu (120 Vatus app.)	80% population engaged in agri. Lower middle income. 186 in terms of export
Greece	131, 957	10.7	Greek	Athens	Euro (0.95)	Petroleum refinery, tourism, fishing (52 GR)

Jotham Napat - Vanuatu's New PM

Vanuatu is one among 39 South Pacific Ocean Island nations lying further east of Australia. The nation is made up of roughly 80 islands that stretch 1,300 kilometres. The islands provide opportunities for scuba diving as well as exploration of shipwrecks and underwater caverns for tourism. Port Vila, the capital and economic centre of the nation, is located on the island of **Efate**. For a population of 2.34 lakhs, there are as many as 6 different religious groups: Presbyterian, RC, Anglican, Seventh Day Adventist, Church of Christ and Assemblies of God serving their Christianity religion.

Elections were held in January for Vanuatu's 52-member Parliament. **Jotham Napat** (52) representing Tanna Constituency and Leaders Party, following secret ballot, was elected unopposed as Vanuatu's new Prime Minister.



Napat's Leaders party secured nine seats and a coalition government was formed including four other political parties. The PM is the 13th in line since the nation's independence in 1980 from joint UK and France rule.

The economic reconstruction of the capital Port Vila following a devastating earthquake in 2024, is the major challenge facing Napat's coalition government.

Constantine Tassoulas - President of Greece

Greece, officially known as Hellenic Republic, is a Southeast European country made up of several peninsulas and more than two thousand surrounding islands, with their land areas being 83% and 17% respectively. In the context of modern society, the population of 10.4 million consists of approximately 88% Christians and 10% atheists.

In February 2025, Greece's Parliament elected **Constantine Tassoulas** (65) as the country's new president after four rounds of voting, succeeding Katerina Sakellaropoulou. Tassoulas, a senior member of the New Democracy party, was MP from 2000 and has held key ministerial positions. As Speaker, he was previously mentioned for not doing enough with investigation on 2023 train crash. Fifty-seven people had died in the accident. However, as Minister for Culture, Tassalous had campaigned for return of Parthenon sculptures by UK. His efforts included

collaboration with high profile lawyers like Amal Clooney and attracting global attention. Tassalous' inclination towards Greek culture and history has been the cornerstone of his political career.

Beginning March 2025, Constantine Tassalous will have the support of Prime Minister Kyriakos Mitsotakis, who believes that the former can bring in his valuable political experience and nationalistic spirit as Head of the State

The Parthenon sculptures controversy centres on whether the sculptures were legally removed from Greece by Lord Elgin in the 19th century. The sculptures are now in the British Museum; the Greek government wants them returned to Athens.

Shri Nagarajan R

World's longest tunnel unveiled

The **Tianshan Shengli Tunnel,** the world's longest expressway tunnel measuring 22.13 km, completed tunnelling, paving the way for the opening of a new shortcut linking southern and northern parts of Northwest China's Xinjiang Uygur Autonomous Region. *"Shengli"* means "victory" in Chinese.

The design features a dual-direction, four-lane tunnel with a design speed of 100 kilometres per hour. It is located in the remote depths of the Tianshan Mountains, at an average altitude of over 3,000 metres. Over the past four years, more than 3,000 workers have worked continuously in high-altitude, low-oxygen environments, while tackling numerous geological challenges and risks such as rock bursts, large deformations in soft rock and collapses. Due to proximity to the Tianshan No. 1 Glacier and Urumqi's water source protection area, innovative techniques, such as the use of tunnel boring machines for the first time in China's road tunnel projects, were employed to expedite construction. The construction team implemented high ecological protection standards to minimise environmental impact, including measures to protect local wildlife habitats and water sources.

Typically, it would take about 72 months to complete the tunnel using conventional methods. However, the builders successfully completed it in just 52 months.

It is a key project of the Urumqi-Yuli Expressway, which runs from the regional capital of Urumqi in northern Xinjiang to Yuli County in southern Xinjiang.

The driving time between the two locations will be reduced from about seven hours to just over three hours, according to Xinhua. The Tianshan Shengli Tunnel demonstrates China's ability to undertake complex engineering projects, reinforcing its position as a global leader in infrastructure development.

The land-based component of the Belt and Road Initiative (BRI) seeks to revive ancient trade routes, connecting China to Europe through Central Asia. Xinjiang as a key region in the BRI, serves as a gateway for China's trade and energy corridors, enhancing connectivity with Central Asia and beyond.

Shri Mrithyunjay GN

DeepSeek

The AI challenging Gemini and ChatGPT

Hangzhou DeepSeek Artificial Intelligence Basic Technology Research Company, known worldwide as **DeepSeek** has interrupted the long running AI race between Gemini and OpenAI with a surprise appearance.

Founded in July 2023 by Liang Wenfeng, a co-founder of the hedge fund High-Flyer, and headquartered in Hangzhou, Zhejian, DeepSeek's origins trace back to High-Flyer's internal AI research focused on AI-driven stock trading.

Because it started as a model to do heavy data analysis on stocks, it has proven valuable in the development of more advanced AI models which can then be applied across other data types.

What makes Deepseek so interesting is that they have, in a way, fundamentally rethought AI development.

Efficiency edge

Most AIs, including Google's Gemini and OpenAI's ChatGPT have been developed by something of a brute force method, by spending immense amounts of money on computing and data that the model can use to become more efficient and reliable.

However, DeepSeek instead adopts a different architecture. Instead of feeding it petabytes of raw data, all to be processed and referenced at once for every task, **DeepSeek uses a "mixture-of-experts" model which allows specialized sub-networks to handle specific tasks**.

This can be explained with an analogy.

Let us say you want to know the answer to the question 2 plus 2. Asking Gemini or ChatGPT is like asking a school principal the question. The principal of a school has a general understanding of most subjects, they know the answer, so they give you the answer you are looking for, which is 4.

But what if the principal is asked a much tougher question. They might have to learn or look up the meaning of some math ideas and only then will they be able to work out the problem.

What DeepSeek does is, instead of the principal answering, they just direct you to the math teacher, someone who specialises in and has been trained to answer math questions. Thereby saving the principal's time and energy, while still ensuring you get the answer.

Feature	DeepSeek	ChatGPT (OpenAI)	Google Gemini
Writing Assistance	Generates quick, concise responses; good for factual summaries	Produces structured, detailed, and well-organized content	Provides well-researched answers with links to sources
Coding Capabilities	Excels in complex coding tasks; provides direct solutions	Reliable for coding but sometimes struggles with complex reasoning	Decent coding assistance, but less popular than ChatGPT
Brainstorming & Creativity	Writes full drafts quickly but lacks variation	Generates multiple ideas with structured content	Similar to ChatGPT, often with extra multimedia integration
Research & Learning	Provides brief, summarized explanations	Gives in-depth, well-organized answers	Offers detailed research and external references
Cost Efficiency	Cheaper than ChatGPT and Gemini	More expensive due to computational costs	Similar to ChatGPT in pricing
Speed & Response Time	Fast, delivers concise results quickly	Fast, but may take longer for detailed responses	Efficient, but response time depends on query complexity
User Interface & Experience	Simple and user-friendly	Highly interactive and user-friendly	Integrated with Google ecosystem for seamless experience
Multimodal Capabilities (Text, Images, Video)	Primarily text-based	Supports multimodal input with GPT-4 Turbo	Strong multimodal capabilities with image and video understanding
Market Popularity & Adoption	Rapidly gaining popularity, especially in China	Most widely used AI chatbot globally	Gaining traction with integration into Google services
Data & Training Sources	Developed in China with focus on efficiency	Trained on a vast dataset but with content restrictions	Trained using Google's extensive database and search index

This essentially leads to significantly reduced computational requirements, translating to lower costs.

Cost-effectiveness

The implications of DeepSeek's approach are profound. Where Gemini and ChatGPT require massive data centres and specialized hardware, DeepSeek aims to achieve comparable performance with more affordable resources. This opens the door for smaller organisations and research institutions to participate in cutting-edge AI development.

Performance and potential

While cost-effectiveness is a key differentiator, DeepSeek's performance is also noteworthy. Benchmarks suggest that it can achieve comparable or even superior results to larger models in certain tasks.

One example of this is Deepseek's ability to write, check and correct complex computer code, which is leagues ahead of anything offered by other contemporary AI Models.

The open-weight advantage

DeepSeek also adopts an open weight model, which is significantly different from the closed-source approach from other AI. This basically means, scientists can investigate the very code and algorithms that the AI runs on as opposed to being dependent on another organisation to run the code for them, while not fully being able to dissect it and look into it.

Researchers and developers can build upon DeepSeek's work, leading to rapid advancements and a more diverse AI ecosystem. This approach is in sharp contrast to the often-secretive nature of large tech companies and allows for greater understanding of the model's capabilities and limitations, which can then be corrected and innovated upon.

The future of AI: a shift in power?

DeepSeek's emergence signals a potential shift in the AI landscape. It challenges the notion that massive resources are the only path to AI dominance and demonstrates the power of innovation and efficiency. As AI becomes increasingly integrated into our lives, DeepSeek's approach could lead to a more accessible and sustainable AI future.

But despite all this, the question must be asked: what marked improvement has all this AI development made in our day-to-day lives. Just something to ponder over.

Smt Anuradha V R

Sunita Williams
sets spacewalk record

NASA astronaut Sunita Williams surpassed a major milestone on 30th January 2025, with 62 hours of spacewalks and joins NASA's top 4 when she broke the record for total spacewalking time held by former astronaut Peggy Whitson, who had done 60 hours and 21 minutes.

Williams was outside the ISS during the spacewalk to maintain the station's hardware and collect surface material samples from Destiny laboratory and Quest airlock for analysis. This spacewalk was part of Expedition 72, and it began at at 7:43 am Eastern Time (ET) and concluded at 1:09 pm ET, lasting 5 hours and 26 minutes. NASA live-streamed the event on YouTube and their official website, marking the 92nd US spacewalk.

Williams (59) and Wilmore went on what was meant to be an eight-day mission to the ISS aboard Boeing's Starliner in June 2024. However, technical issues including helium leaks and thruster malfunctions meant that the Starliner was unsafe for their return. NASA plans to bring them back to Earth in late March aboard a spaceship built by SpaceX, a rival company of Boeing. Despite these setbacks, the astronauts have continued their work aboard the ISS while awaiting a safe journey home.

It was the ninth spacewalk for Williams and the fifth for Wilmore. **Any time an astronaut gets out of a vehicle while in space, it is called a spacewalk. A spacewalk is also called an EVA. EVA stands for extravehicular activity.**

The first person to go on a spacewalk was Alexei Leonov. He was from Russia. The first spacewalk was on 18th March 1965. It was 10 minutes long.

The first American to go on a spacewalk was Ed White. His spacewalk was on 3rd June 1965, during the Gemini 4 mission. White's spacewalk lasted 23 minutes.

Why do astronauts go on spacewalks?

Astronauts go on spacewalks for many reasons. Spacewalks let astronauts work outside their spacecraft while still in space. Astronauts can do science experiments on a spacewalk. Experiments can be placed on the outside of a spacecraft. This lets scientists learn how being in space affects different things.

Spacewalks also let astronauts test new equipment. They can repair satellites or spacecraft that are in space. By going on spacewalks, astronauts can fix things instead of bringing them back to Earth to fix.

Kum Anu Narayan

Health news from Africa

Niger - First African nation to eliminate *Onchocerciasis*

In a major achievement for global health, Niger has been officially recognised by the World Health Organization (WHO) for eliminating onchocerciasis, **also known as river blindness.** This makes Niger the fifth country in the world and the very first in Africa to stop the transmission of the parasite *Onchocerca volvulus,* which causes the disease.

River blindness is a parasitic disease spread by the bite of an infected black fly, especially near rivers. It can lead to severe itching, skin changes and even blindness. The disease has caused great suffering, particularly among poorer communities in rural areas. By eliminating it, Niger has helped its people live healthier lives and has set an example for other nations. It is also important for countries to work together to fight diseases that affect millions.

Niger's journey to eliminate river blindness began many years ago. From 1976 to 1989, under the WHO Onchocerciasis Control Programme in West Africa, Niger used insecticides to reduce the number of black flies. Later, when the pharmaceutical company Merck, Sharpe & Dohme donated the medicine **ivermectin,** Niger began mass drug administration (MDA) from 2008 to 2019. Ivermectin not only helped treat onchocerciasis but was also used to fight another disease called **lymphatic filariasis.** As a result, these combined efforts made a huge difference.

In 2014, after stopping the mass drug treatment for lymphatic filariasis in most areas, Niger began testing to see if the transmission of onchocerciasis had truly been interrupted. Detailed surveys and studies, which looked at both the insects and the people, showed that the disease's prevalence had dropped dramatically—**from about 60% to a mere 0.02%!** This enormous reduction proved that Niger's efforts had worked.

Niger's success did not happen by chance. It was the result of strong partnerships between the Nigerien government, WHO, and various non-governmental organisations. These groups worked together to gather resources, share technical expertise and continuously monitor the disease. This teamwork allowed them to adjust their strategies quickly and effectively, ensuring that the efforts to eliminate river blindness were successful.

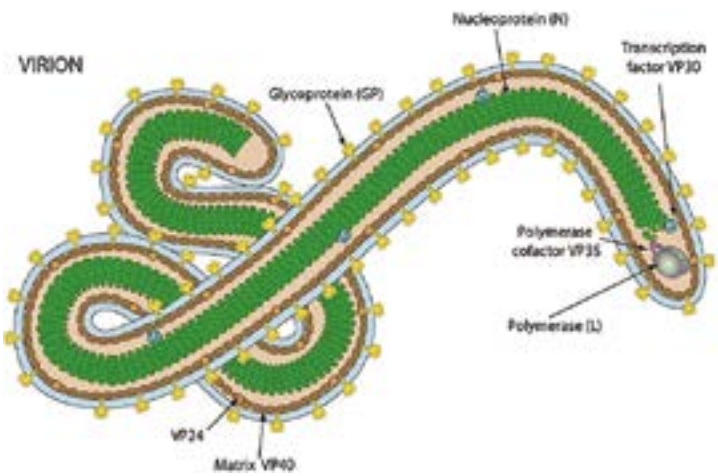
Dr. Matshidiso Moeti, the WHO Regional Director for Africa, said, "Onchocerciasis has long caused immense human suffering. Niger's success ends this burden for its people and positions Niger as a model for the elimination of neglected tropical diseases in Africa." She also pointed out that the removal of diseases like river blindness can help communities develop economically by freeing people from the challenges of a debilitating illness.

Niger's achievement joins that of four other countries—Colombia, Ecuador, Guatemala and Mexico—that have been verified by WHO for eliminating onchocerciasis. It is also the second major disease Niger has eliminated; the country was certified free of **dracunculiasis,** also known as **Guinea-worm disease,** in 2013.

This historic milestone in Niger offers hope to many nations still battling onchocerciasis and other neglected tropical diseases, showing that with dedication and cooperation, even the toughest challenges can be overcome.

Uganda launches Ebola vaccine trial

Uganda has made history with a new clinical trial for an Ebola vaccine during an outbreak. This is the world's first trial to test how well a vaccine works against Ebola caused by the **Sudan virus.** The trial was launched by Uganda's Ministry of Health, together with the World Health Organization (WHO) and other partners, showing a great step forward in fighting this deadly disease.



When an Ebola outbreak was confirmed on 30th January, scientists and health officials worked very quickly. **In just four days, they prepared to start the trial.** The vaccine being tested comes from IAVI, an organisation that had already done safety tests on it. Now, the trial will check if the vaccine can stop people from getting sick. **This trial is happening right in the middle of an outbreak, which makes it even more important.**

The vaccine was donated by IAVI and the project is supported by several organizations, including

- **World Health Organisation,**
- **Coalition for Epidemic Preparedness Innovations (CEPI),**
- **Canada's International Development Research Centre (IDRC),**
- **European Commission's Health Emergency Preparedness and Response Authority (HERA),** and
- **Africa Centres for Disease Control and Prevention (Africa CDC).**

These partners all work together to make sure the trial is safe and follows international rules.

At a ceremony in Kampala, Uganda's Minister of Health officially launched the trial. WHO leaders including Dr. Mike Ryan and Dr. Kasonde Mwinga were there to help

and support the process. The trial will use a **"ring vaccination" strategy. This means that people who were in contact with the first confirmed case—about 40 individuals, including those who were close to a health worker who sadly died—will be vaccinated first.**

This trial is very important because, until now, there has been no licensed vaccine for Ebola caused by the Sudan virus. Vaccines and treatments exist for other types of Ebola, but not for this one.

If this candidate vaccine works, it could help control the outbreak and provide the data needed to get it officially approved.

Before this trial, researchers had prepared by training teams in proper clinical practices. WHO experts even came to Uganda over the weekend to support the trial and ensure everything is done correctly. Additionally, vaccine doses were already stored safely in the country, and WHO has an agreement with IAVI to get more doses soon.

This quick and careful response shows that, with teamwork and advanced planning, scientists can fight dangerous diseases and help save lives around the world.

Mount Taranaki granted legal personhood

On 30th January 2025, New Zealand's Parliament passed a historic law granting legal personhood to Mount Taranaki, known as **Taranaki Maunga** in Māori culture. This decision recognises the mountain as a living entity with legal rights, responsibilities and protections, acknowledging its deep cultural and spiritual significance to the Taranaki Māori people.

Mount Taranaki, the second-highest peak on New Zealand's North Island, is an iconic landmark with a near-perfect volcanic cone. While admired for its natural beauty, it holds a far greater meaning for the local Māori, who regard it as an ancestor. **The recognition of its legal personhood, now referred to as *Te Kāhui Tupua*, is an important step in honouring indigenous traditions and restoring historical injustices.**

This decision follows similar precedents in New Zealand, such as the legal personhood granted to ***Te Urewera*** Forest in 2014 and the **Whanganui River** in 2017. By extending this recognition to Mount Taranaki, New Zealand reaffirms its commitment to environmental conservation and indigenous governance. **The law ensures that the mountain is safeguarded from commercial exploitation and ecological harm, reinforcing the principle that nature is not merely a resource but a revered entity.**

A governing body will be established to oversee Mount Taranaki's management, consisting of representatives from local Māori iwi (tribes) and government-appointed officials. This co-governance model empowers the Māori community to take an active role in preserving the mountain's ecological and cultural integrity. It also strengthens New Zealand's broader efforts towards reconciliation with indigenous communities, reinforcing respect for their knowledge and custodianship of the land.

The passage of the law was met with celebration, as traditional Māori songs and ***haka*** performances echoed through Parliament. This moment symbolises more than just legal recognition; it is a step toward embracing indigenous wisdom and fostering a deeper connection between people and nature.

As the world faces growing environmental challenges, New Zealand's approach sets a powerful example. Recognising Mount Taranaki as a legal entity underscores a shift in how societies view and protect the natural world. This landmark decision ensures that ***Te Kāhui Tupua*** remains preserved for future generations, reinforcing the balance between cultural heritage and environmental conservation.

Shri Sampath D

Prime Minister Narendra Modi who co-chaired the AI Action Summit with French President Emmanuel Macron in Paris, stated that the world is at the "dawn of the AI (Artificial Intelligence) age", and called for collective efforts to establish a global framework for AI that would uphold shared values, address risks, build trust and ensure access to all, especially the Global South.

He underlined the need for open-source systems that would enhance trust and transparency and build data sets "free from biases".

He further said that AI can help transform millions of lives by improving health, education, agriculture and so much more, it can help create a world in which the journey to sustainable development goals becomes easier and faster.

He began his speech with an illustrative example, "If you upload your medical report to an AI app, it can explain in simple language, free of any jargon, what it means for your health. But, if you ask the same app to draw an image of someone writing with their left hand, the app will most likely draw someone writing with their right hand. Because that is what the training data is dominated by. It shows that while the positive potential of AI is absolutely amazing, there are many biases that we need to think carefully about."

Loss of jobs is AI's most feared disruption. However, history has shown that work does not disappear due to technology.

Its nature changes and new types of jobs are created. There is an imperative need to invest in skilling and re-skilling our people for an AI-driven future. There will also be requirement of green power to fuel its future and in this regard India and France have excellent co-operation having worked together for years through initiatives like the International Solar Alliance.

It is seen that India has successfully built a Digital Public Infrastructure for over 1.4 billion people at a very low cost. It is built around an open and accessible network. It has regulations and a wide range of applications to modernise our economy, reform governance and transform the lives of our people. It has made digital commerce democratic and accessible to all. This vision is the foundation of India's National AI Mission.

India will host the next Global AI Summit later this year.

Shri Ramaswamy R

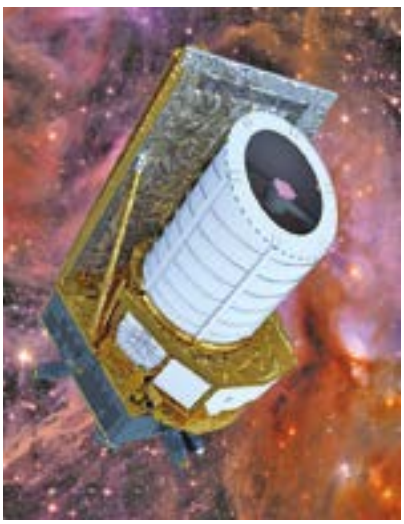
Euclid captures a perfect Einstein Ring

When astronomers observed the night sky using a radio telescope tuned to 408 MHz, they saw distant pulsars, star-forming regions and supernova remnants instead of point-like stars.

Astronomy since the 20th century has grown by leaps and bounds with electronics, telecommunication and satellites playing a major role in space research. When astronomers observed the night sky using a radio telescope tuned to 408 MHz, they saw distant pulsars, star-forming regions and supernova remnants instead of point-like stars. With the same telescope mounted on orbiting satellites and spacecrafts, the scientists could observe electromagnetic waves across both visible and non-visible spectra without distortion by the Earth's atmosphere and this opened up a whole new universe in front of them.

The European Space Agency named their spacecraft Euclid after the mathematician who lived around 300 BC and is considered the father of geometry. Euclid took off on 1st July 2023, from Cape Carnival Florida, arriving at L2 Lagrange Point in about a month. It is ever since in a halo orbit around Lagrange Point L2, and is keeping pace with Earth as it orbits the sun. On a six-year mission, Euclid started sending pictures of deep universe. Even as early as September 2023, astronomers could make astonishing discoveries about galaxies present close to Earth.

One such discovery was the presence of **Einstein Ring** (ER) around **galaxy NGC6505**.



Though NGC6505 was known as early as 1884 nothing was known about ER and the background galaxy.

The ring is named after Einstein, who predicted that light bends around massive objects in space, focusing like a lens. **In this case, the foreground galaxy (NGC6505) is around 590 million light-years from Earth, a stone's throw away in cosmic terms.** The detection could be made possible only following Euclid's voyage with high-resolution instruments.

The unnamed background galaxy 4.42 billion light years away could now be studied through bending of light.

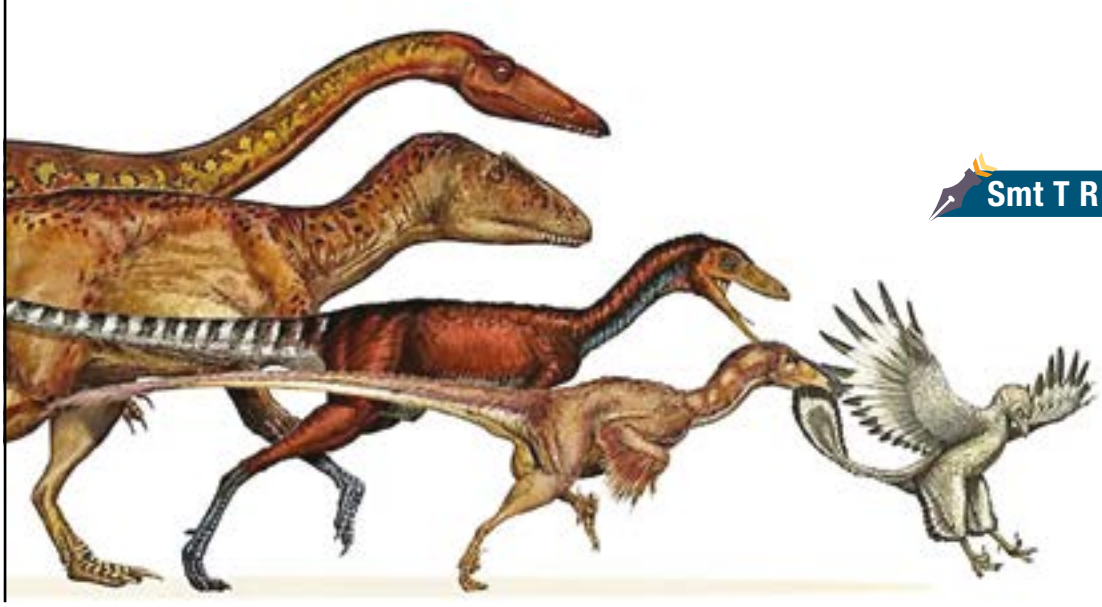
Einstein Ring around NGC6505

About L2 Lagrange Point

- Located 1.5 million km directly behind Earth as viewed from the sun.
- Orbits the sun at the same rate as Earth.
- Provides clear view of deep space for telescopes.
- Spacecrafts keep the Sun, Earth and Moon behind for solar power.
- Named after the Italian French mathematician from the 18th century.

Euclid's mission includes mapping the positions and shapes of galaxies, study of dark matter, dark energy and of gravitational lensing. The spacecraft is expected to map more than a third of the sky, observing billions of galaxies 10 billion light years away using around 1,00,000 strong lenses.

- **An Einstein ring, also known as an Einstein–Chwolson ring or Chwolson ring (named after Orest Chwolson), is created when light from a galaxy or star passes by a massive object on its way to the Earth. Due to gravitational lensing, the light is diverted, making it seem to come from different places. If source, lens and observer are all in perfect alignment (syzygy), the light appears as a ring.**
- **Orest Danilovich Khvolson or Chwolson was a Russian and later Soviet physicist and honorary member of the Soviet Academy of Sciences. He is most noted for being one of the first to study the gravitational lens effect.**
- **The gravitational lens effect is a phenomenon where a massive object like a galaxy cluster bends the path of light from a distant object behind it, acting like a lens and magnifying the light, allowing astronomers to observe faint or distant objects that would otherwise be too far away to see.**



Smt T R Shubha

Jurassic fossil reveals clues to bird evolution

The record of humankind from pre-historic to modern by archaeologists has been truly fascinating. The urge to uncover non-human life forms on this planet has been equally captivating.

Birds and Jurassic Era

Birds are the most diverse group of terrestrial vertebrates in the animal kingdom. Jurassic era refers to that golden period in earth's geological history when Dinosaurs thrived and the first birds appeared. Palaeontologists have claimed that the birds evolved from dinosaurs about 160 million years ago. This early transformation though has not been backed by adequate fossil evidence till date, except for the feathered **Archaeopteryx** (found in Germany,1861)—crow-sized bird, seemingly half bird and half reptile, seen as an intermediate link between dinosaurs and modern avians.

Groundbreaking discovery

A research team led by Professor Wang Min from the Institute of Vertebrate Paleontology and Paleoanthropology (IVPP) of the Chinese Academy of Sciences discovered two bird fossils in Jurassic-era rocks from Fujian Province in southeast China dating back approximately 149 million years.

The first of the fossil, a quail-sized bird with a short tail structure, called ***Baminornis zhenghensis,*** about six inches long, was far more advanced anatomically and a better flier than archaeopteryx.

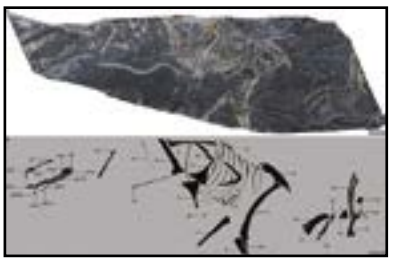
It shows a unique combination of advanced features, including derived ornithothoracine bird-like shoulder and pelvic girdles, as well as a plesiomorphic hand structure resembling that of non-avialan dinosaurs.

The second fossil consisting solely of a furcula is incomplete and its placement within birds needs further fossil evidence.

What this means for bird evolution

The fact that Baminornis and Archaeopteryx are so different yet lived at different parts of the world at the same time, suggests a diverse history for early bird development. It indicates that the there was more than one type of bird during this period and were probably, already flying all over the world. The fossils also signifies that the bird evolution was more complex than was previously understood.

More such fossil findings in the future will help us with accurate understanding of the flight-path and the time period, birds took to the sky.



DO YOU KNOW ?

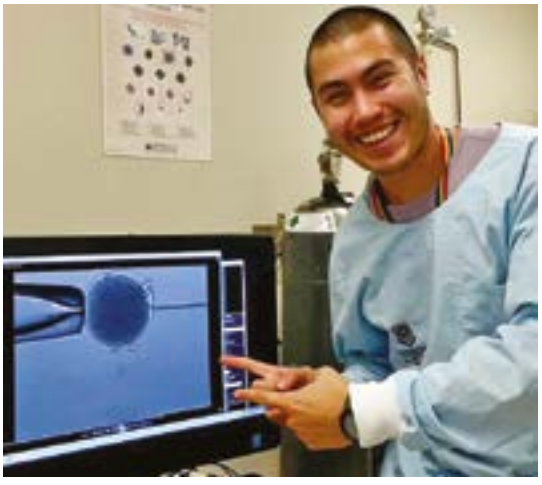
- **Furcula is a forked bone in birds that supports strengthening of thoracic skeleton to withstand rigours of flight.**
- **Plesiomorphic is an evolutionary trait that is homologous (having the same origin) within a particular group of organisms but is not unique to members of that group and therefore cannot be used as a defining character for the group.**

Shri Sridhar P

World's first kangaroo embryos created via IVF

The world's first kangaroo embryos created using IVF (***in vitro*** **fertilisation**) was achieved in February 2025 by a team led by **Andres Gambini** at the University of Queensland in Australia. The technique of IVF has been in use quite successfully in humans for several years. However, its use as one of several innovative approaches in the protection of endangered wildlife is indeed a pioneering effort.

Extinction of species is an ugly painful reality. While the process of evolution favours the proliferation of best suited species, humans have evolved as a powerful evolutionary change agent. Never in the eventful history of earth's life has a single species chipped away large portions of its impressive array of life. Several waves of extinction have come and gone due to the forces of nature. However the current overreach of our way of life that endangers wildlife demands innovative solutions.



Australia's woes: According to Australian Non-profit Council, **Australia has lost 33 mammalian species since European settlement got underway.** This represents a higher rate of extinction when compared to other continents. The original inhabitants of Australia, the Aborigines lived successfully for 40,000 years. Like all ancient societies the Aborigines had exceptional knowledge of their immediate surroundings and a deep respect for anything natural. The arrival of Europeans hastened extinction of species, thanks to plain ignorance of their immediate surroundings and naked greed.

Innovative Australian effort: Andres Gambini and his colleagues looked at the growth of kangaroo eggs and sperm in laboratory settings before creating embryos using a technique called **intracytoplasmic injection.** His ambition is laudable when he observed that his goal is to support the preservation of endangered marsupials like Tasmanian devil, koalas and possum. The extinction of species nowadays can be directly attributed to habitat loss, climate change, proliferation of invasive species etc. However, it is quite welcome if modern technology is deployed as an adjunct to all known methods to preserve wildlife.

Intracytoplasmic sperm injection (ICSI) is a procedure that involves injecting a single sperm directly into an egg. It is a type of *in vitro* fertilisation that can help with infertility.

Brahmachari Gurupriya Chaitanya

mahakumbh 2025

The *Kumbh* Mela, held every 12 years, is one of the most celebrated gatherings in Bharat, attracting millions of seekers, saints and devotees from across the world. Among the four sacred locations where the *Kumbh* is observed—**Haridwar, Ujjain, Nashik and Prayaga**—Prayaga stands out as the ***Tirtharaja*** (the king of pilgrimage sites). This confluence of the Ganga, Yamuna and the mystic Saraswati is revered as a site of immense spiritual potency, with scriptural references extolling its sanctity and cosmic alignment during the Kumbha Mela.

What is significant about this *Mahakumbh* is that close to 60 crore people took a dip in the sacred waters and the whole thing was facilitated smoothly by the Government of Uttar Pradesh. The event generated approximately ₹2 lakh crore in revenue, boosting India's GDP.

It created around 8,00,000 jobs across sectors like travel, hospitality and infrastructure. Extensive infrastructure developments, including roads and sanitation facilities, benefited local communities. Socially, the *Mela* fostered unity among diverse Hindu communities, transcending caste and economic distinctions. The festival also showcased India's rich cultural heritage through various exhibitions and performances.

The *akharas* are central to the *Kumbh Mela*, representing ancient sects of ascetics who play a pivotal role in the festival's rituals and spiritual significance. Rooted in the teachings of Adi Shankaracharya, these organisations were established to unite ascetics and safeguard *Sanatan Dharma*. The term "*akhara*", derived from *akhand* (indivisible or eternal), symbolises unity and resilience. There are 13 traditional *akharas*, including six primary ones like *Shri Juna Akhada* and *Shri Niranjani Akhada,* each with distinct practices. Their activities at the *Kumbh Mela* include grand processions, meditation, initiation of followers and the iconic *Shahi Snan* (royal bath), which is believed to purify the soul. *Naga Sadhus* known for their distinctive appearance, often covered in ash, symbolising their renunciation of worldly possessions are given great reverence and prime importance at the *kumbh melas*.

The legend of the *Kumbh*

The origin of the *kumbh* is traced back to the *Samudra Manthana* (churning of the cosmic ocean) described in the ***Bhagavata Purana, Vishnu Purana*** and other texts. As the *devas* (gods) and *asuras* (demons) churned the ocean for *amrita* (nectar of immortality), drops of nectar fell at four locations—Prayaga, Haridwar, Ujjain and Nashik.

These drops sanctified the waters of these sites, making them powerful sources of spiritual rejuvenation.

Astronomical significance

The *Maha Kumbh Mela* is one of the largest spiritual gatherings in the world, deeply rooted in Indian astronomical and mythological traditions. Its significance is tied to planetary alignments and ancient scriptures that highlight the importance of specific celestial configurations for spiritual purification and enlightenment.

The timing of the *Kumbh Mela* is determined by the relative positions of the Sun, Moon and Jupiter in specific zodiac signs.

When Jupiter (*Bṛhaspati)* moves into Aquarius (*Kumbha*) and the sun is in Aries, the *Kumbh Mela* is celebrated at Haridwar.

When Jupiter is in Taurus and the Sun and Moon are in Capricorn, it occurs in Prayagraj.

Other configurations determine the celebrations at Ujjain and Nashik.

This alignment is considered auspicious for spiritual cleansing and renewal, as per Indian traditional wisdom. It is believed that these positions magnify the positive spiritual energies in the locations where the rivers flow.

The legend of the Prayagraj

Prayaga, also known as Prayagraj, has been celebrated as *Tirtharaja* in the spiritual traditions of Bharat. This ancient and sacred city is located at the confluence of the Ganga, Yamuna and the Saraswati, a hidden river revered in the Vedic and puranic traditions. Prayaga is a site where cosmic principles, divine events and spiritual disciplines converge, making it a centre of unparalleled significance in *Sanatan Dharma.*

Significance from scriptures

The significance of the *Kumbh* at Prayag is deeply embedded in various scriptures. Here are some specific references to Kumbh at Prayag from sacred texts:

1. *Matsya Purana*

The *Matsya Purana* also extols the sanctity of Prayag, emphasising the importance of the Triveni Sangam and the celestial alignments that mark the Kumbh Mela.

Sanskrit verse:

"तत्र प्रयागे सगङ्गे यमुनायां तथैव च।यत्र संगममासाद्य मुच्यते सर्वकिल्बिषैः॥"

(**Transliteration:**"Tatra Prayāge Sagangē Yamunāyāṃ tathaiva ca|Yatra saṅgamamāsādya mucyate sarvakilbiṣaiḥ||")

(**Translation:** "At Prayag, where the Ganga and Yamuna meet, one who reaches the confluence is freed from all sins.")

This verse highlights the unique spiritual power of bathing at the confluence during specific times like the *Kumbh.*

2. *Padma Purana (Svarga Khanda)*

The *Padma Purana* emphasises Prayag's position as the Tirtharaja and elaborates on the celestial significance of the *Kumbh.*

Sanskrit verse:

"प्रयागं भुवनानां तु सर्वतीर्थेश्वरं विदुः।माघे स्नात्वा हि कुम्भे तु ब्रह्मलोकं गमिष्यति॥"

(**Transliteration**:"Prayāgaṃ bhuvanānāṃ tu sarvatīrtheśvaraṃ viduḥ|Māghe snātvā hi kumbhe tu brahmalokaṃ gamiṣyati||")

(**Translation:**"Prayag is regarded as the lord of all pilgrimages. Bathing during *Kumbh* in the month of Magha leads one to *Brahmaloka*.")

3. *Brahma Purana*

The *Brahma Purana* describes the spiritual potency of Prayag during the *Kumbh* and mentions the *Amrita Kalasha* (pot of nectar) associated with Samudra Manthan.

Sanskrit verse:

"प्रयागे स्नानमात्रेण सर्वपापैः प्रमुच्यते।विशेषतः कुम्भे पुण्यं यत्र देवाः सदा स्थिताः॥"

(**Transliteration:** "Prayāge snānamātreṇa sarvapāpaiḥ pramucyate|Viśeṣataḥ kumbhe puṇyaṃ yatra devāḥ sadā sthitāḥ||")

(**Translation:** "Merely bathing at Prayag liberates one from all sins. During the *Kumbh,* the merit multiplies manifold, as divine beings are constantly present there.")

4. Mahabharata *(Vana Parva, Tirtha Yatra Parva)*

The Mahabharata contains an early reference to Prayag as an essential stop in Yudhishthira's pilgrimage, associating it with immense spiritual merit.

Sanskrit verse:

"गङ्गायमुनयोः संधौ त्रिवेण्यां यः स्नाति मानवः।स पापं तत्क्षणात्त्यक्त्वा ब्रह्मलोकं गतो नरः॥"

(**Transliteration:** "Gaṅgāyamunayoḥ sandhau triveṇyāṃ yaḥ snāti mānavaḥ|Sa pāpaṃ tatkṣaṇāttyaktvā brahmalokaṃ gato naraḥ||")

(**Translation**:"A person who bathes at the confluence of the Ganga, Yamuna and Saraswati instantly sheds all sins and ascends to *Brahmaloka*.")

5. Ramayana *(Ayodhya Kanda)*

During his exile, Lord Rama visited Prayaga and stayed at the ashram of Sage Bharadwaja.

Scriptural reference

Valmiki Ramayana, Ayodhya Kanda, Chapter 54, Verse 1 "Let us go to the auspicious Prayaga, situated at the confluence of three rivers, where a person, after bathing, is freed from all sins."

Shahi Snan

The *Shahi Snan* holds immense spiritual significance in the *Maha Kumbh Mela*, symbolising the purification of the soul and liberation from the cycle of birth and death. It is believed that during specific planetary alignments, the sacred rivers are imbued with divine nectar (*amrit*), and taking a dip in them washes away past sins, granting spiritual merit and *moksha*. Key *snan* days include ***Makar Sankranti , Mauni Amavasya, Vasanta Panchami, Magha Purnima*** and ***Maha Shivratri.*** These dates are considered highly auspicious for taking the ritualistic dip in the sacred confluence of the three rivers.

The *Mahakumbh Mela* at Prayagraj, rooted in the cosmic cycle of celestial alignments, is more than just a festival—it is a profound expression of *Sanātan Dharma*, where ancient rituals, philosophical discourses and acts of devotion merge into an unparalleled spiritual experience. As pilgrims take the holy dip in the *Triveni Sangam,* they not only cleanse their sins but also reaffirm their connection with the eternal flow of *dharma*.

The *Mahakumbh* is a testament to the resilience of India's cultural heritage, a timeless tradition that continues to inspire generations, fostering unity, faith and the pursuit of higher knowledge.

Shri Sampath D

ISRO successfully docks satellites

In October 2024, the Government announced that India will have its own space station, called the Bharatiya Antriksh Station by 2035.

The Indian Space Research Organisation (ISRO) in the early hours of 16th January 2025, successfully executed the **Space Docking Experiment (SpaDeX)** making India the fourth country after USA, Russia and China achieve this technological milestone. The SpaDeX mission is an important project by ISRO which is designed to develop and demonstrate the technology needed for spacecraft rendezvous, docking and undocking using two small satellites.

The two satellites SDX01 (Chaser) and SDX02 (Target) which were launched by the PSLV C60 in December 2024, successfully docked as the space agency officials oversaw the complex docking procedure. It is imperative to note that docking technology plays a vital role in space when multiple rocket launches are needed to achieve common mission objectives.

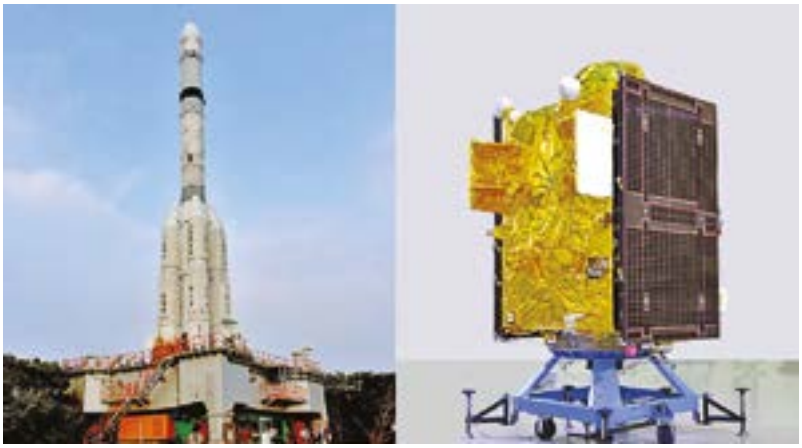
ISRO has also announced that undocking and power transfer tests will be conducted in the coming days.

This docking experiment is crucial for the successful execution of the country's ambitious future missions, including Chandrayaan-4, Gaganyaan, establishing a space station, and landing an astronaut on the moon. In October 2024, the Government announced that India will have its own space station, called the ***Bharatiya Antriksh Station*** by 2035.

ISRO launches NVS-02, marks 100th mission from Sriharikota

The launch of GSLV-F15/NVS-02 Mission being the 100th, is not to be seen as yet another landmark milestone but marking a quantum leap in India's space journey.

The 100th launch from Sriharikota, need to be looked at



as a symbol of India's accelerated progress in space exploration. **From decades of gradual development to a decade of transformational growth,** ISRO's journey stands as a testament to India's technological prowess and its aspirations to take a prime place in the global space economy. With new infrastructure, increased private participation, and record-breaking investments, India is poised for even greater achievements in the years to come.

There has been a rapid rise of private sector participation in space. In 2021, there were barely single-digit number of space startups. Today, the number is nearing 300, many of which are world-class enterprises and entrepreneurial success stories. India is positioning itself as a frontline player in the global private space sector. This can be seen in the investments seen in the sector which has surged, with ₹1,000 crore invested in 2023 alone. The space economy, currently valued at USD 8 billion, is projected to reach USD 44 billion in the next decade, further cementing India's role as a global space powerhouse.

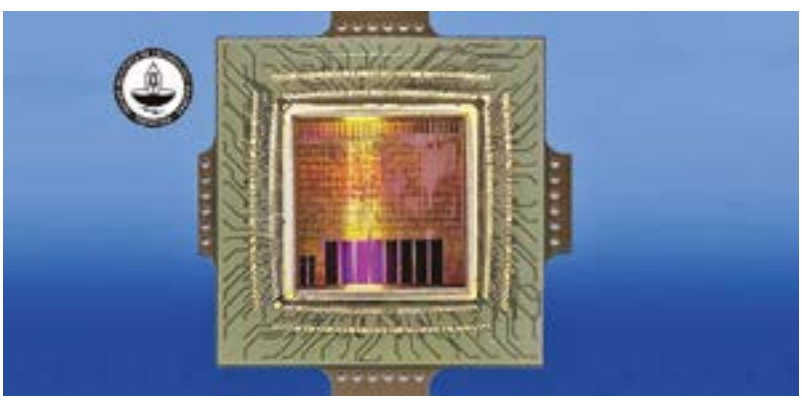
India's is also becoming a leading light in the commercial space launches. These days a substantial number of satellite launches including foreign ones are being carried out through ISRO, reflecting the global confidence in our capabilities. **There is an imperative need to acknowledge the visionary contributions of early pioneers like Vikram Sarabhai and Satish Dhawan, whose efforts laid the foundation for India's burgeoning space sector.**

ISRO and IIT Madras unveil indigenous chip for Space

The Indian Institute of Technology Madras (IIT-M) and ISRO have achieved a breakthrough in indigenous technology with the successful development and booting of an aerospace-quality, SHAKTI-based semiconductor chip. This marks a significant stride towards self-reliance in semiconductor technology.

The 'IRIS' **(Indigenous RISCV Controller for Space Applications)** chip was developed from the 'SHAKTI' processor baseline. It can be used in IoT (internet of things) and computer systems. This development is part of ISRO's effort to indigenise semiconductors for its applications, command and control systems, and critical functions, aligning with the *'Atmanirbhar Bharat'* initiative in space technologies.

The 'IRIS' chip's development is noteworthy because it was entirely conceived, designed and manufactured within India. The chip design and implementation were carried out by IIT-M, fabrication was done by the Semiconductor Laboratory (SCL) in Chandigarh, packaging by Tata Advanced Systems Ltd. in Karnataka and the motherboard was manufactured by PCB Power in Gujarat. This end-to-end indigenous development exemplifies India's capabilities in semiconductor design and fabrication, marking a significant milestone in the 'Make in India' initiative.



RISC-V (pronounced "risk-five") is an open standard instruction set architecture (ISA) based on established reduced instruction set computer (RISC) principles. The number five refers to the number of generations of RISC architecture that were developed at the University of California, Berkeley since 1981.

Archeological News

Ancient Sanskrit inscription Found in PoK

The Archaeological Survey of India (ASI) has uncovered a 4th-century Sanskrit inscription outside Gilgit in Pakistan-occupied Jammu & Kashmir.

Significance

- It sheds light on ancient religious practices.
- Brahmi script was used.
- The inscription reads: "Pushpasingha, for the merit of his guru (name partially lost), installed a Mahesvaralinga."

DO YOU KNOW ?

- **Uttar Pradesh has commenced the renovation and excavation of the ancient *Mritya Kup* (well of death) at *Kot Purvi,* located within the Sambhal Kotwali police station area.**
- **A four member team of the ASI also conducted a survey of the recently – discovered Shri Kartik Mahadev Temple, five '*theerthas*' (pilgrimage sites) and 19 *koops* (wells).**

Previous instances

- Five months ago, the ASI deciphered a Sanskrit inscription sent from Pakistan.
- The Swat valley in Pakistan is home to Buddhist rock inscriptions written in Sanskrit using Nagari script, a variant of Gupta script associated with the Gupta Empire (240-550 CE).
- These inscriptions, etched on granite, include verses from Buddhist texts, highlighting the valley's historical significance as a centre of Buddhist learning and practice.

Archaeological Experiential museum launched in Vadnagar

The Union Ministry of Culture and Gujarat State Government inaugurated a cutting-edge Archaeological Experiential Museum in Vadnagar, a town in Gujarat known for its 2,500-year-old history. The museum aims to preserve and showcase Vadnagar's historical and cultural heritage.

What is an experiential museum?

An experiential museum aims to stimulate multiple senses of attendees and immerse them in an engaging environment.

HIGHLIGHTS

- A modern museum complex featuring cutting-edge design and technology.
- Covers an area of 12,500 sq.m. with nine thematic galleries.
- Includes a 4,000 sq.m. excavation site, with visible archaeological remains up to 16-18 metres deep.
- ₹298 crore investment for the project includes five years of operational maintenance.

Structure

- Main Museum Building houses a comprehensive collection of artefacts and interactive exhibits.
- 50-meter Connecting Bridge links the museum building to the excavation site.
- Permanent structure over excavation site ensures visitor safety while providing an informative view of the archaeological remains.

Exhibits and collections

- More than 5,000 artefacts showcase Vadnagar's historical evolution.
- Includes ceramic assemblages, coins, ornaments, weapons, tools, sculptures and organic materials like food grains, DNA and skeletal remains.
- The museum blends physical exhibits with immersive digital experiences for a comprehensive visitor experience.

Additional initiatives

- International conference on Vadnagar's archaeology.
- A television series by Discovery Channel to showcase Vadnagar's history.
- **The Prerna School:** An educational programme aimed at inspiring young minds and fostering future leaders focused on preserving India's heritage.

Discovery of a rare Umamaheshwara sculpture in Karnataka

A significant historical artefact, a Umamaheshwara metal sculpture, has been unearthed in Taggunje, Ajri village, Kundapura taluk, Udupi district, Karnataka.

The sculpture, made of five metals (*panchaloha*), is a masterpiece of religious art and culture. It depicts Lord Shiva seated on a lotus platform, with his consort Parvati (Uma) sitting on his left lap.

Details of the sculpture

- features intricate designs and high craftsmanship.
- Lord Shiva is adorned with a *Jatamukuta* (crown of matted hair) and a third eye on his forehead.
- His back right hand holds a *parashu* (axe), while his back left hand holds a *mriga* (deer).
- The front right hand displays the *abhaya mudra* (gesture of reassurance and safety, dispelling fear), and the front left hand rests on Parvati's left thigh.
- Above Shiva's head is a five-headed serpent, providing a canopy.
- Parvati holds a lotus bud in her left hand, while her right hand supports Lord Shiva.
- She is crowned with a *kirita* (ornamental headgear) and adorned with intricate jewellery.
- The platform features Lord Ganesha on Shiva's right, Shanmukha (Kartikeya) on the left, and Nandi (Shiva's bull) beneath Shiva's right foot.
- The sculpture is framed by a beautifully crafted *prabhavali* (arch), with a centrally located lion or *kirtimukha* (glory face) symbolising protection and power.

Historical context

- When the sculpture's base was examined, it revealed two lines inscribed in Kannada script dating back to the 17th century.
- **First Line:** "*Murti Saakshi*," translating to "on the witness of this idol", indicating the sacred significance of the sculpture.
- **Second Line:** "G 3 ke ra Shu 14," revealing that 3 *gadhyanas* (units) of gold, constituting 14% of the sculpture, were used in its creation.
- These inscriptions confirm the sculpture's 17th century origin, crafted in the 12th century style, reflecting its adherence to traditional craftsmanship.

Cultural significance

- The sculpture represents the combination of **Shaiva, Shaktha** and **Naga** cult traditions of the medieval period.
- Highlights India's syncretic spirituality and medieval artistry blending multiple religious traditions.

Shri Arpith Vijayan

New Pangolin species discovered

Scientists from The Zoological Survey of India (ZSI) have proposed a new species of Indo-Burmese Pangolin (Scientific name: *Manis indoburmanica*). During a routine examination of Chinese Pangolin (Scientific name: *Manis pentadactyla*) scales that was seized in India, some of these scales were identified to be different as per the mitochondrial DNA analysis, thereby getting recognised as a new species.

The first live specimen of the Indo-Burmese Pangolin was found in Arunachal Pradesh. Researchers also added that this new species originated approximately 3.4 million years ago.

The species is believed to also inhabit other parts of India like Bhutan, Nepal and Myanmar. The features of this Pangolin include a pinkish face with dark brown and olive brown scales and share common features to that of other Pangolins already seen. Other species of Pangolin include Chinese, Indian (*M. crassicaudata*), Sunda (*M. javanica*) and Philippine (*M. culionensis*) - and four African: black-bellied (*Phataginus tetradactyla*), white-bellied (*Phataginus tricuspis*), Temminck's (*Smutsia temminckii*) and the giant ground pangolin (*Smutsia gigantea*). The total number of known Pangolin species would be nine, if this new species is also added to the list.

Senior scientist of ZSI, Mukesh Thakur mentioned that the late identification of this new species (Indo-Burmese Pangolin) was due to limited genetic studies. "Historically, pangolin taxonomy has relied heavily on morphology" - physical characteristics - "which can be misleading due to similar physical traits among species. The advent of genomic tools and high-throughput sequencing allowed us to uncover this cryptic diversity," he said.

This discovery also shares a pressing concern for pangolin conservation as they are exploited for traditional medicines and for ornamental use of their scales. As the Indo Burmese Pangolin looks like the Chinese Pangolin, they are still likely to be listed as 'critically endangered'. The other eight species are already under highest level of protection and the commercial trade of this new species would also be a concerning issue.

The Environmental Investigation Agency (EIA) will be following up on this Pangolin conservation along with other issues just like they did for other Pangolin species.

Smt Sandhya Nair

Eastern India's first astronomical observatory

Eastern India has officially opened its doors atop Panchet Hill in the Garpanchkot area of Purulia district, West Bengal to a remarkable establishment **Satyendra Nath Bose Astronomical Observatory**. It is the sixth observatory of its kind across India.

The observatory has been established by the **Satyendra Nath Bose National Centre for Basic Sciences**. The non-polluted area that is far removed from city lights, provides an ideal environment for astronomical observations. The location ensures that the readings are accurate and free from light pollution, which is detrimental to astronomical research in urban areas. This environmentally pristine location will play a significant role in advancing space science research.

Highlights

- The construction of the observatory commenced in 2012. It is built on 4.9 acres of land.
- It has one 14-inch diameter telescope; another 1-metre diameter telescope will be installed soon.
- The observatory has been set up at an altitude of 600 metres above the sea level. It is positioned at 86° East longitude, a unique location with few other observatories along this meridian, which extends from the Arctic Ocean in the north to Antarctica in the south.
- An automatic weather forecast centre has also been set up near the observatory which will be helpful for measuring rainfall.

Advantages

This new observatory is expected to revolutionise the field of space sciences in the region, particularly astronomical research. By providing cutting-edge tools for both students and researchers, it will contribute significantly to India's space research capabilities and will facilitate a deeper understanding of the universe and contribute to important discoveries in the realm of astronomy.

The establishment of this observatory underscores India's growing focus on strengthening its position in the global astronomy and space science community. **It is a step forward in making India a major player in the field of scientific research, as it enhances both national and international collaboration in space exploration and astrophysics.**

Smt Meenakshi S

Inaugural Kho Kho World Cup 2025

India has made history by clinching both the **men's and women's titles** at the inaugural Kho Kho World Cup 2025, held in January at the Indira Gandhi Arena in New Delhi. This landmark event featured 23 countries across six continents, with 20 teams for the men and 19 teams for the women competing in the fast-paced seven-a-side format.

The men's team triumphed over Nepal scoring 54-36. Captain Pratik Waikar and standout player Ramji Kashyap were instrumental in the win, with Waikar's exceptional skills and Kashyap's spectacular skydives keeping Nepal on the defensive.

The Indian women's team mirrored their male counterparts' success by **defeating Nepal 78-40** in the final. **Captain Priyanka Ingle** led with multiple touch points, establishing a strong foundation in Turn 1. A stellar Dream Run by B Chaithra in Turn 4, lasting over five minutes, sealed the victory. The women's team's journey to the title included impressive wins over South Korea, Iran and Malaysia in the group stages, followed by commanding victories against Bangladesh in the quarterfinals and South Africa in the semifinals.

This double triumph underscores India's dominance in the sport, with both teams cementing their legacy as inaugural Kho Kho World Cup champions. PM Modi congratulated the teams, highlighting the historic nature of the victories and their potential to inspire future generations.

The success marks a significant milestone in the sport's history, bringing international attention to one of India's oldest traditional games. The event's success is expected to inspire countless young athletes across the nation to pursue Kho Kho, contributing to its growth and popularity in the years to come.

DO YOU KNOW ?

The origins of Kho Kho can be traced back to ancient India. It is believed that Kho Kho originated from the Mahabharata, where warriors used it to build agility and reflexes. The game's history is intertwined with India's military traditions, where speed, agility and strategy were crucial for survival.

Smt Sarada Devi Ravutu

Festivals for tourism

The Pangsau Pass International Festival 2025

India is a land of geographical diversities. Owing to its locational factors, Arunachal Pradesh is rich in water resources, but lacking in infrastructure.

Organising The **Pangsau Pass International Festival (PPIF)** 2025 is one of the strategies adopted by the Government of Arunachal Pradesh to develop the State.

Inaugurated in 2007, this festival is annually held in Nampong, Changlang district of Arunachal Pradesh.

This year's festival is particularly special as it coincides with the 80th anniversary of the Second World War's conclusion.

Geographical significance - Pangsau Pass

Location: The Patkai Hills on the India-Myanmar border (Arunachal Pradesh) and a critical section of the historic Ledo Road (Stilwell Road). The pass derives its name from the village of Pangsau in Myanmar.

Altitude: 3,727 feet (1,136 m)

Historical significance: In the 13th century, the Ahoms, a Shan tribe, used to enter Assam through this route.

World War II: The Stilwell Road, also called the Ledo Road, was built to connect British India to Nationalist China, serving as a critical supply route for Allied forces battling Japanese troops. The steep and muddy terrain of Pangsau Pass, nicknamed "Hell Pass," posed significant challenges to its construction.

Objectives

The festival facilitates border crossings without passports to encourage cross-border trade and to exhibit the cultural richness of Northeast India and Myanmar.

This year's festival welcomed a 150-member delegation from Myanmar, enhancing cooperation and understanding.

The Arunachal Pradesh government is boosting tourism thereby generating employment opportunities for local communities.

Sambhar Festival 2025 in Rajasthan

The Rajasthan Tourism Department and District Administration organised The Sambhar Festival, a vibrant celebration of culture, adventure, and heritage, from 24th to 28th January 2025, at the famous Sambhar Lake in Rajasthan.

Objectives

To attract tourists by showcasing the Rajasthani civilisation, including its cuisine, folk arts and cultural heritage, with a special focus on the stunning Sambhar Lake and its surrounding attractions.

Highlights

Kite flying, camel riding, parasailing, ATV (All-terrain vehicles) rides, bird watching and lake visits.

Sambhar Lake

The lake is renowned for its salt production and as a migratory destination for millions of foreign birds, particularly from November to March. The lake's scenic beauty and its heritage mansions make it a major attraction. The festival highlights the vast tourism potential of the region, which attracts a large number of domestic and international visitors each year.

Smt Uthra Dorairajan

125 years of solar physics research

Celebrating 125 Years
Kodaikanal Solar Observatory

DO YOU KNOW?

Geodesy is the science of accurately measuring and understanding the earth's geometric shape, orientation in space and gravitational field.

Our country has been a forerunner in studying the solar system for nearly a millennium. We have a huge repository of knowledge and data on observational astronomy by our countrymen for centuries. This dates back to the diverse efforts in various parts of our land contributed by **Kerala school of astronomy and mathematics right from the 14th century**, by designing of different *yantras* at Jantar Mantars by 1700s and many such.

The precision and accuracy on celestial systems and geodesy by our subcontinent had a great impact on sea voyagers, as they went far and wide searching for resources. Later with speedy colonisation, this information helped the west consolidate details of landmass, plan for better tax collection, export wealth of India by laying road and railways.

Britishers set up Madras observatory in 1786. This later formed the base for the Great Trigonometrical Survey, for which the contribution by the Indian astronomers is huge and mind blowing. Data we had already accumulated on solar spots, Venus transits, eclipses and many other celestial events, along with precise calculations of different latitudes from Ujjain meridian attracted astronomers and seafarers from the west to expand their wisdom. **John Evershed,** an established amateur solar observer was one among them, who shifted Madras observatory to Kodaikanal by 1899, and worked with a team of Indians designated as “assistants”!

In the initial years, this observatory focussed on studying the spectra of sun spots with the help of **spectroheliograph**. Since its inception, this observatory has been providing invaluable insights into sun's behaviour and its impact on earth through its repository of photographic images. It was at the helm of development of solar astrophysics with improvised technology.

The Kodaikanal Solar Observatory (KSO) of the Indian Institute of Astrophysics (IIA), a cornerstone of Indian astronomy has been at the forefront of solar research. The observatory's unique location, coupled with its state-of-the-art equipment has been making significant contributions to our understanding of sunspots, solar flares, coronal mass ejections and other solar phenomena. On the 125th anniversary of KSO, we are celebrating the birth and growth of solar astronomy and solar physics in the country. Our scientists at the solar physics research group here are engaged in theoretical, numerical modelling and observational studies in solar physics. Pioneering research on understanding solar magnetism in high resolution, the magnetic fields that are responsible for the activity of the Sun is another key area here.

Variations in conditions inside the solar system caused due to solar activity has its effects in the immediate vicinity of earth, on earth's magnetosphere and ionosphere, on the auroral activity in earth's atmosphere. Studies on solar weather by the Solar Physics research group here and their significant contribution for Aditya-L1 mission through the **Visible Emission Line Coronagraph** has opened new frontiers of discovery in solar astrophysics.

A space based facility for this is now operational in partnership with several other Indian institutions and the ISRO.

It is important to note that some of these observational facilities and the back-end instruments are due to continuing in-house design, fabrication and developmental efforts with indigenous technology. Be it low frequency radio observations of the sun, occultation studies of solar corona using cosmic radio continuum sources, imaging of the sun, or radio spectroscopic studies of corona, our scientists have made their impact in the international solar research communities. We can proudly say, that our country has huge facilities and capability in solar physics research and calls for new instrumentation designing techniques that ISRO can launch in collaboration with IIA.

To commemorate this 125th year, a conference on 'Sun, Space Weather, and Solar-Stellar Connections' was organised in January 2025 by IIA.

- **A spectroheliograph is an instrument that takes photographs of the sun in monochromatic light. It is used to study the sun's surface and surroundings.**
- **Auroral activity is the occurrence of auroras, which are natural light displays in the polar regions of Earth. They are caused by solar activity, such as solar flares and coronal mass ejections.**
- **The Visible Emission Line Coronagraph (VELC) is a space-based instrument that studies the sun's corona. It was developed by the Indian Institute of Astrophysics (IIA) in Bengaluru and is a primary payload on the Aditya-L1 spacecraft.**

The Union Budget 2025 was presented by the Union Finance Minister Nirmala Sitaraman on 1st February 2025. Before we proceed to have a look at this year's budget let us understand what a budget is and the process involved in presenting it.

What is a budget?

Article 112 of the Indian Constitution requires the Union Government to present an Annual Financial Statement to the Parliament for every financial year. The financial year runs from 1st April to the 31st March. The statement includes the estimated receipts and expenditure of the Government and is divided into the Consolidated fund, Contingency fund and Public account. The Financial statement includes the details of tax revenues and other receipts, details of expenditure, allocation of plan outlays to various ministries and departments and details of resource transfer by the union to the States and Union territories. **The Budget is classified into the Revenue Budget and the Capital Budget which include the receipts and expenditure respectively.**

The Budget documents include the Annual financial statement, Demands for grants, Receipts budget, Expenditure budget, Finance Bill, Memorandum explaining the provisions of the finance bill, Budget at a glance, Highlights of the Budget, Status of implementation of the announcements made in the earlier budget, Fiscal Responsibility and Budget Management Act related documents.

The process

The budgetary process in India includes the presentation of Budget, general discussion, scrutiny by departmental committees,voting on demands for grants, passing of the Appropriation Bill and the Finance Bill.

Budget 2025 – insights

The Budget 2025 has focused on the following four engines of development:

1) Agriculture: The Budget covers a wide spectrum - ***Atmanirbharta*** in pulses, comprehensive programme for vegetables and fruits, Makhana board, National mission on high yielding seeds, fisheries, cotton productivity and many other areas. Key programmes like the P**rime Minister Dhan – Dhaanya Krishi Yojana** (developing agri districts programme) and rural prosperity and resilience programme aim at enhancing agri productivity and improving rural economies. This is expected to improve the demand in Tier 2 and 3 towns. The enhancement to the Kisan credit card scheme with an increased loan limit of ₹5 lakhs, will further support farmers, fishermen and dairy farmers.

2) Mico Small and Medium Enterprises: Many tangible actions have been taken to leverage this segment.

- The investment and the turnover limits for classification have been enhanced by 2.5 and 2 times respectively.
- Customized credit cards for micro enterprises have been introduced and a new Fund of Funds with a fresh contribution of ₹10,000 crores has been set up.

- A new scheme for 5 lakh women, Scheduled Castes and Scheduled Tribes first-time entrepreneurs to provide term-loans up to ₹2 crore in the next 5 years has been announced.
- A national **Manufacturing Mission** covering small, medium and large industries for furthering Make in India has also been announced.
- Schemes and initiatives for improving Footwear and leather, Toys and Food processing sectors have been introduced.

3) Investment: The key focus for investment is on people, economy and innovation.

People: Initiatives like Atal Tinkering labs, Expansion of capacities in IITs, National centres of excellence for skilling, Expansion of medical education and centre for excellence in AI for education are focused at skilling and upskilling the youth. These initiatives will certainly help India reap the full dividend of its demography.

Economy: Lot of initiatives and funds have been announced to help the economy to scale up. Public Private Partnership in Infrastructure, Jal Jeevan Mission, Asset Monetisation plan 2025-30, Nuclear Energy Mission for Viksit Bharat, Maritime Development Fund, mining sector reforms and many other initiatives have been announced.

Innovation: ₹20,000 crores has been allocated to implement private sector driven research, development and innovation. **DeepTech funds, PM Research Fellowship** and the **National Geospatial Mission** are some of the initiatives to spur innovation.

4)Exports: **Exportspromotion mission, BharatTradeNet** (BTN) for international trade and national framework for **Global Capability Centres** are some of the focused initiatives that have been planned to drive exports.

To fuel all these, financial sector reforms are being put in place.

On the Direct tax front, the exemption limit for personal income tax has been raised. Apart from this actions to reduce the compliance burden and improving the ease of doing business are being taken.

On the Indirect tax front, rationalisation of Customs tariff structure for industrial goods, basic customs duty relief on import of drugs and medicines and extensive support to domestic manufacturing and value addition by way of exemption or reduction of basic customs duty are on the anvil.

Some numbers of interest

The estimates for the year 2025-26 are:

- **Total receipts - ₹50.60 lakh crores.**
- **Total expenditure - ₹54.90 lakh crores.**
- **Net tax receipts - ₹28.37 lakh crores.**
- **Fiscal deficit - 4.4% of GDP.**
- **Gross market borrowings - ₹14.82 lakh crores.**
- **Capex expenditure - ₹11.21 lakh crore** (3.1% of GDP) earmarked in FY2025-26.

On the revenue side, approximately

- **24%** comes from borrowings
- **22%** from income tax
- **18%** from GST and other taxes
- **17%** from corporate tax.

On the expenditure side

- **22%** goes to the states as part of their share of taxes and duties
- **20%** goes towards interest payments
- **16%** towards central sector schemes
- **8%** each towards Defence, centrally sponsored schemes, Finance Commission and other transfers and other expenditure.

Conclusion

The Union Budget 2025-26 strikes a balance between fiscal prudence and growth ambition. To the credit of this Government, it should be said that it has always given priority to long-term economic growth over populism.

It is a bane that in India the political discourse on the Budget has always been political rhetoric and not substance. However the common people should objectively read the fine print, understand and then assess the budget.

Budget 2025 has adopted reforms as the *hita* (meaning happiness, comfort, security, or welfare) to attain the *purushartha* (purpose of human life) of **Viksit Bharat** with inclusivity as the *taraka mantra.*

S.R.Sai Ananya | Student

SAMMAN SANJEEVANI APP

On 24th January 2025, in a significant event commemorating **National Girl Child Day,** Haryana Cabinet Minister Shruti Choudhry officially launched the 'Samman Sanjeevani' app. **This innovative initiative is designed to provide vital services and support to women and girls from Below Poverty Line (BPL) households, specifically targeting those aged between 10 and 45 years.** The app represents a critical component of the Haryana Government's ongoing commitment to ensuring the delivery of welfare benefits to its citizens, particularly the most vulnerable groups. The app seeks to improve women's and girls' overall quality of life in these households.

This initiative builds upon the foundations of the **'Mahila Evam Kishori Samman Yojana,'** launched in 2023. The primary objective of this scheme is to provide free sanitary napkins to women belonging to BPL communities, thereby promoting menstrual hygiene and health awareness. The integration of the **'Samman Sanjeevani'** app is expected to enhance the efficiency and reach of this programme, ensuring that essential supplies reach those in need promptly. Additionally, the launch was particularly significant as it coincided with the 10th anniversary of the **'Beti Bachao Beti Padhao'** scheme, a landmark initiative aimed at promoting the empowerment and protection of girls in India.

During the launch, Minister Shruti Choudhry emphasized the significance of both the new app and the ongoing 'Beti Bachao Beti Padhao' scheme.

She also highlighted the government's efforts to continue empowering women and raising awareness about women's rights, especially regarding daughters. **The app collects data on all beneficiaries, providing updates on monthly benefits.**

Kum Kavya R

Four new Ramsar wetlands in India

India has made this year's World Wetlands Day (2nd February) a lot more special by announcing the addition of four new Ramsar sites in India, increasing the total to 89.

The newly designated Ramsar sites include **Udhwa Lake Bird Sanctuary** (Jharkhand), **Khachoedpalri Wetland** (Sikkim) and **Sakkarakottai** and **Therthangal** bird sanctuaries in Tamil Nadu.

This is a significant milestone for Sikkim and Jharkhand, as they have secured their first-ever Ramsar sites. With the addition of these Ramsar sites, the total area covered as designated sites is now 1.358 million hectares.

A Ramsar site is a wetland site designated to be of international importance under the Ramsar Convention, also known as **The Convention on Wetlands** which is the intergovernmental treaty that provides the framework for the conservation and wise use of wetlands and their resources. It was adopted in the Iranian city of Ramsar in 1971 and came into force in 1975. Since then, almost 90% of UN member states have acceded to become "Contracting Parties."

As of today, there are 2,532 Ramsar wetlands in the world. With 89 sites, India has the most Ramsar sites in Asia. In India, Tamil Nadu is leading the conservative effort with 20 Ramsar sites.

About 4 New Ramsar Sites

 **Sakkarakottai Bird Sanctuary (Tamil Nadu)**	• **Location: Near Gulf of Mannar,** on the **Central Asian Flyway.** • **Historical Significance: Sakkarakottai Tank** was dug in **1321 A.D.** through **Kudimaramattu** (community participation). • Hosts **species** like **Painted Stork, Black-headed Ibis, etc.**
 **Therthangal Bird Sanctuary (T.N.)**	• **Location:** Near **Gulf of Mannar,** on the **Central Asian Flyway.** • Home to **species** like **Painted Stork, Black-headed Ibis, Spot-billed Pelican etc.** • Notable for the **Babul (Acacia nilotica) trees.**
 **Khachoedpalri Wetland (Sikkim)**	• **Also Known as Wishing Lake,** believed to fulfill wishes; locally called **Sho Dzo Sho** ("Oh Lady, Sit Here"). ○ Originally **Kha-Chot-Pairi,** meaning **"Heaven of Padma-sambhava".** • **Cirque-type wetland,** considered **sacred** by both **Buddhists and Hindus.**
 **Udhwa Lake (Jharkhand)**	• Named after **Saint Uddhava** from **Mahabharata,** a friend of **Lord Krishna.** • Declared as Wildlife Sanctuary and **Important Bird Area (IBA).** ○ Sanctuary has two water bodies i.e. Patauran and Berhale. • Home to bird species like **House Swifts, Fishing Eagles, and Brahminy Kite.**

Udhwa Lake Bird Sanctuary

Comprising two lakes, **Pataura Lake** and **Barhel Lake**, the Udhwa Lake Bird Sanctuary is surrounded by the Rajamahal Hills and linked by a channel to the Ganga River. In 2016, the site was designated as an **Important Bird and Biodiversity Area** due to its role in providing habitat for over 140 birds. Among these, the site provides habitat for the endangered band-tailed fish eagle, the vulnerable common pochard and the adjutant stork.

Khachoedpalri Wetland

Khachoedpalri Wetland is a temperate Himalayan high-altitude wetland ecosystem. The central lake is surrounded by peatland and a temperate forest, providing more than 680 species critical refuge from volatile mountain conditions. Notably, the site serves as an important habitat and stopover site for birds migrating across the Himalayas, including the critically endangered **Baer's pochard**. It is also home to the endangered red panda and the vulnerable Himalayan black bear, both of which are endemic to the region.

Sakkarakottai Bird Sanctuary

Sakkarakottai Bird Sanctuary is a wetland located within three villages in southern Tamil Nadu. The wetland plays a crucial role in preventing soil erosion, replenishing groundwater, and serving as a buffer during floods and extreme rainfall. It supports more than 120 species of birds. In 2012, the site was designated as a bird sanctuary. The abundant babul trees in the site provide ideal nesting habitat for eight bird species, including the near-threatened spot-billed pelican.

Therthangal Bird Sanctuary

Therthangal Bird Sanctuary is a marshy lake located within Therthangal village, Ramanathapuram district, in southern Tamil Nadu. It is fed by two rivers during the rainy season. 96 bird species have been recorded on the site, including the endangered Egyptian vulture and the vulnerable Indian spotted eagle.

Protecting our wetlands

Various studies have demonstrated that wetland area and quality are on the decline. Wetlands are often referred to as cradles of biological diversity, serving as a home for an immense variety of species from microbes and plants to mammals. **They play a crucial role in our food web, maintaining the ecology of watersheds and protecting us from flash floods.** It is of utmost importance to protect these lands and conserve the species that inhabit them.

Continued efforts from the Indian government in conserving our biodiversity hotspots are a much needed and commendable effort.

Shri Mrithyunjay GN

Army and IIT Guwahati create bamboo bunkers

Bamboo's lightweight nature also facilitates easier transportation and construction, particularly in challenging terrains.

There is a saying about innovation, attributed to Mark Zuckerberg, "Move fast and break things".

One of the things that get sidelined in this rush forward towards development without looking back, is that we often fail to see the long-term repercussions of our actions.

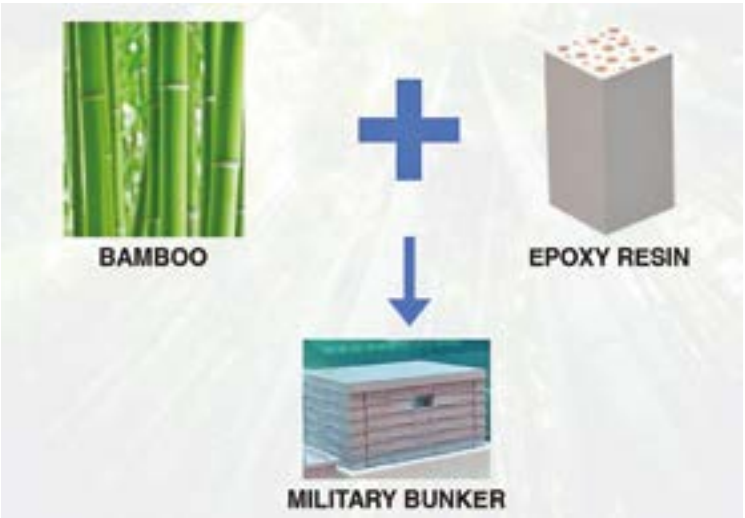
While it may certainly be appealing to rush to develop the newest, shiniest thing, we truly must be conscious of how we get there. And so we come to the idea of sustainable development.

In a significant step towards sustainable and resilient defence infrastructure development, the Indian Armed forces have partnered with the Indian Institute of Technology Guwahati (IIT-G) to develop bamboo-based bunkers.

This collaboration aims to leverage the inherent strength and abundance of bamboo to create cost-effective and environmentally friendly alternatives to traditional concrete and steel fortifications in areas where transportation and setup may be expensive and environmentally damaging.

Known for its high tensile strength, comparable to steel, and its rapid growth cycle, bamboo presents a viable and sustainable resource. Its lightweight nature also facilitates easier transportation and construction, particularly in challenging terrains.

IIT Guwahati's expertise in material science and structural engineering has played a pivotal role in this initiative. Researchers are focusing on developing innovative treatment and processing



techniques to enhance the durability and longevity of bamboo structures. This includes addressing issues like moisture resistance, pest infestation and fire retardancy.

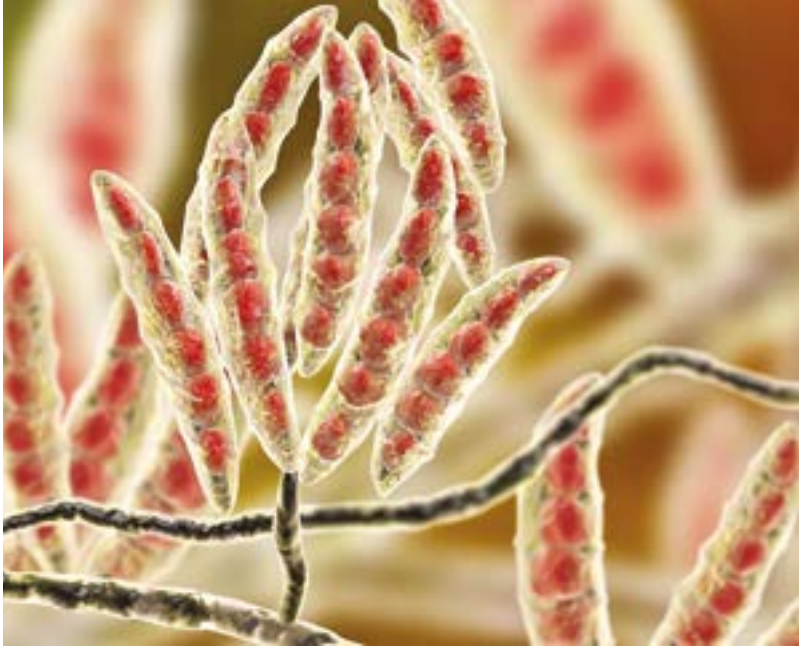
The collaboration also aims to explore the optimal design configurations for bamboo bunkers, ensuring they meet the structural requirements of military applications.

The benefits of these bamboo bunkers extend beyond their structural integrity. By utilising a readily available and renewable resource, the project contributes to reducing the carbon footprint associated with traditional construction materials. Furthermore, the localised sourcing of bamboo can help rural economies and create employment opportunities in regions where the resource is abundant.

The Army's involvement ensures that the developed technology is rigorously tested and evaluated in real-world scenarios. Field trials will assess the bunkers' performance under various climatic conditions and potential threat scenarios.

This collaboration between the Army and IIT-G signifies a strategic shift towards incorporating sustainable and indigenous materials into defense infrastructure.

The success of this project could have far-reaching implications, not only for military applications but also for civilian infrastructure. The development of bamboo-based solutions highlights the potential of a more sustainable future, while still focusing on development.

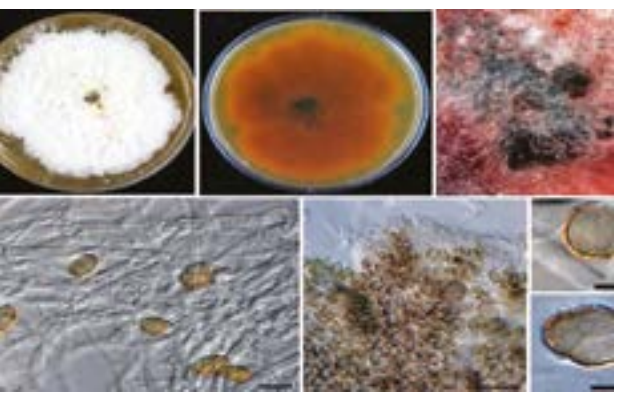


Phytopathogenic fungus discovered

Kum Sunita D Behera

Researchers at Banaras Hindu University (BHU) in Varanasi have discovered a new type of species of phytopathogenic fungus called *Epicoccum indicum*. This fungus is harmful to plants and causes a disease called leaf spot in *Chrysopogon zizanioides,* a plant more commonly known as *vetiver* or *khus*.

Vetiver is a plant important for making medicines and essential oils.



It is also used to help protect the soil from erosion. However, the appearance of this fungus could harm *vetiver* crops, which is a concern for both farmers and industries. This discovery was published in the journal ***Fungal Diversity*** in December 2024, and represents a significant advancement in the study of plant pathogens and fungal biodiversity.

The disease caused by *Epicoccum indicum* affects the leaves of *vetiver* plants. It creates small, discoloured spots on the leaves, which are known as leaf spots. These spots can be brown, yellow or black and can damage the plant's ability to make food through photosynthesis. When a plant's leaves are damaged, the plant becomes weaker because it can't produce enough energy to grow. If the disease spreads, it can cause the plant to lose its leaves entirely, and in the worst case, the plant may die.

To discover this new fungus, the researchers used special methods. First, they studied the fungus's shape and how it grew on different surfaces.

Then, they used molecular analysis, which involves studying the genetic material (DNA) of the fungus.

This helped them understand that *Epicoccum indicum* is different from other types of fungi and belongs to a separate group.

This discovery is important because it helps scientists learn more about harmful fungi that can affect plants.

By understanding how these fungi spread and cause disease, researchers can develop ways to stop them from damaging crops.

This might involve using special treatments or creating new types of plants that can resist these diseases.

Col Shashidhar M V (Retd)

Naval vessels commissioned

Inauguration ceremony

On 15th January 2025, PM Narendra Modi inaugurated three frontline naval vessels in an impressive ceremony at the Naval Dockyard in Mumbai (coincidentally being the 77th Army Day).The vessels commissioned include INS Surat, INS Nilgiri and INS Vagsheer.

Significance

This unprecedented 'tri-commissioning' event was a red-letter day in the annals of Indian military and defence manufacturing at multiple levels. The commissioning of three major naval war-vessels highlights the nation's increasing maritime influence and might in the Indian Ocean Region and among the littorals of South and Southeast Asia as a net security provider. Further, design, development and manufacture (DDM) of these frontline vessels with up to 75% indigenous content amply demonstrates our swift advancement towards becoming a global frontrunner in defence production and self - reliance in manufacturing.

Modernisation plan

The induction of modern naval crafts (destroyers & frigates) is a testament to our Navy's modernisation plan which aims at comprehensive enhancement of our operational capabilities by transforming the current 129 platform-strong service into a 200-ship-strong force by 2050 and rapid transformation into a blue-water navy. Submarine modernisation similarly envisions induction of conventional and nuclear-powered submarines.

INS SURAT

INS Surat is the fourth vessel under Project-15B with a total project outlay of ₹35,800 crores. The ship is the last in the line of P-15 class destroyers which included the Delhi-Class (P-15), the Kolkata-Class (P-15A) and the Visakhapatnam-Class (P-15B). Sea trials of this most modern ship commenced in June 2024 and successfully completed in November 2024 before delivery by Mazagon Dock Shipbuilders Ltd (MDL) on 20th December 2024 - a unique record in six months.

Designed by the Navy's Warship Design Bureau (WDB), constructed by MDL and overseen by Warship Overseeing Team (WOT), Mumbai (a specialised unit responsible for supervising the construction and delivery of warships) the entire process was finished in 31 months.

Design features

INS Surat is part of the Visakhapatnam-Class of Stealth Guided-Missile Destroyers built under Project-15B (approved by the Defence Acquisition Council in 2009), with improved stealth, automation and ordnance features over the Project-15A ships.

With a high indigenous content of 72%, surpassing that of the warships built under Projects P-15 and P-15A, this flagship combat-ready platform reaffirms India's commitment to self-reliance. **Incidentally it is also the Navy's first AI-enabled warship!**

Technical features

- The warship is powered by four gas turbines as part of its Combined-Gas-Turbine-

and-Gas-Turbine (COGAG) propulsion system. Special features include

- Displacement - 7,400 tonnes.
- Length -164 m.
- Top speed - 30 knots (over 55 kmph).
- Max range - 9,200 nautical miles (17,000 km).

Major armament & equipment include

- Vertical Launch System (VLS) for 16 BrahMos anti-ship missiles.
- VLS for 32 Barak-8 Surface-to-Air missiles.
- Italian OTO Melara 76-mm forward gun and four Russian AK-630 close-in weapon systems (CIWS).
- Anti-submarine warfare (ASW) systems.
- 4 X 533mm heavyweight torpedo tube launchers and 2 X RBU-6000 ASW rocket launchers.
- Decoy launchers and torpedo countermeasures.
- Can house two helicopters and mounts a heli-deck which allows operation of a vast range of helicopters for deep sea missions.

INS NILGIRI

INS Nilgiri, a Stealth Guided-Missile Frigate (SGMF) is the lead-ship of Project-17A (a follow-on programme of Project-17) with improved armament and stealth technology. This warship has also been designed by the WDB and constructed by MDL and overseen by WOT. After successful completion of sea-trials in August 2024 the vessel was delivered on 20th December 2024.

The development and commissioning of the Shivalik Class surface stealth-frigates under Project-17 began under Maritime Capability Perspective Plan (MCPP) with four ships under Project-17 built by MDL. The construction load of Project-17A will be shared between MDL for four ships and Kolkata-based Garden Reach Shipbuilders & Engineers Ltd (GRSE).

Technical features

- Total displacement - 6,670 tonnes.
- Length - 149 m.
- Top speed - 32 knots (59 kmph).
- Maximum range - 5,500 nautical miles (~10,200 km).
- It mounts a Combined-Diesel-and-Gas (CODAG) propulsion system.

The frigate incorporates a plethora of design concept for improved survivability, stealth and manoeuvrability.

Armament & equipment

- Advanced weaponry including VLS for 8x BrahMos supersonic anti-ship cruise missiles and for 32x Barak surface-to-air missiles.
- An OTO Melara 76-mm forward gun and the BHEL-manufactured upgraded 76/62mm Super Rapid Gun Mount (SRGM) CIWS.
- Fire control system.
- DART programmable guided ammunition.

Equipped similarly like INS Surat including the helicopters and deck facility, it houses similar

weaponry for all-round capability against surface and sub-surface targets. The frigate is housed with the CMS-17A Combat Management System (CMS), Israeli S-Band AESA radar and Tata Advanced Systems' Lanza-N L-band Air-Surveillance Radar.

INS Vagsheer

INS Vagsheer is a diesel-electric attack submarine and the sixth and final submarine to be built under the aegis of the P-75 Kalvari-Class Scorpene Project. The vessel has been designed by the French Naval Group and manufactured by MDL. The submarine was launched from MDL on 21st April 2022 and commissioned along with INS Surat and INS Nilgiri.

Mission employability - Anti-surface & anti-submarine warfare, sea control/denial, intelligence gathering, area surveillance and special operations.

Technical features

- Length - 67.5 m.
- Max speed - 11 knots (20 kmph) surfaced and 20 knots (37 kmph) submerged.
- Max diving depth - 350 m and can sustain at sea for 50 days.
- Surface displacement - 1,615 tonnes and submerged displacement of 1,775 tonnes.
- Propelled by four German MTU 12V 396 SE84 diesel engines.

Design

The hydrodynamic shape reduces underwater drag and its acoustic-absorption technology minimises noise and magnetic signatures. It will therefore contribute to its low signature.

It boasts a high level of automation with an Integrated Platform Management System and a CMS which integrates equipment, systems and sensors and an indigenous Ku-Band SATCOM (Rukmini).

Armaments on board include 6 × 533 mm torpedo tubes for 18 Surface and Underwater Target (SUT) torpedoes, OR SM.39 Exocet anti-ship cruise missiles and 30 mines in place of torpedoes.

INS Utkarsh

Utkarsh - means 'superior in conduct'. The second of the two multi-purpose vessels (MPV) (first being INS Samarthak), INS Utkarsh is capable of towing ships, launching and recovering various targets, operating unmanned autonomous vehicles and acting as a trial platform for various indigenous weapons and sensors. It was launched on 13th January 2025 from Kattupalli (L&T Shipbuilding Ltd) near Chennai exactly three months after Samarthak.

The design engineering of the MPVs has been undertaken at L&T's in-house Warship Design Centre at Chennai and the construction accomplished at L&T's Kattupalli shipyard.

Technical features

- Length - 106 m.
- Width - 18.6m.
- Displacement - over 3,750 tonnes.
- Maximum speed - 15 knots

The MPVs are highly specialised and play multiple roles, including serving as trial platforms, for the development of next generation weapons and sensors. They will perform maritime surveillance, humanitarian assistance, combat sea pollution, besides taking up launch and recovery of surface and aerial assets.

Launch of both indigenous MPVs in quick succession to provide cutting-edge defence platforms to support own Navy's fleet expansion is in keeping with the vision of **Atmanirbhar Bharat.**

Col Shashidhar M V (Retd)

Sanjay
Battlefield surveillance system

Project Sanjay is a noteworthy initiative designed to create a comprehensive battlefield surveillance system.

Rewind

- Our Army observed 2023 as the **'Year of Transformation'** to set itself on a course to become a "future-ready, technology-driven, lethal and agile force" and establishes itself as an "iron cast pillar of national power.
- Creating a battlefield surveillance system to provide a composite operational picture to commanders and staffers at all levels for swifter decision-making saw the genesis of Project Sanjay.
- The Battle Surveillance System (BSS) will provide an integrated surveillance picture to commanders and staffers at all levels besides completing the sensor-shooter grid by integrating it with the Artillery Combat Command and Control and Communication System (ACCCS).
- Bharat Electronics Limited, Ghaziabad, is the project's system integrator.
- Defence Minister Rajnath Singh flagged off 'SANJAY" on 24th January 2025.

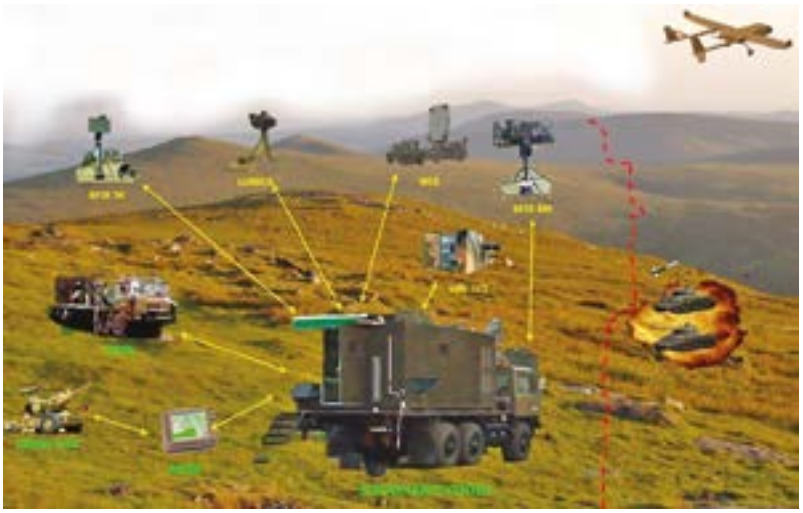
Necessity

Project Sanjay is a noteworthy initiative designed to create a comprehensive battlefield surveillance system. Its primary objective is to establish multiple surveillance centres that will integrate a wide array of sensors and provide commanders at all levels with a unified operational picture across different terrain and

allowing speedy decision making thus boosting the Army's overall operational preparedness.

Project SANJAY

- These systems will be inducted to all operational Brigades, Divisions & Corps in three phases from March to October 2025, which has been declared as **'Year of Reforms'** in the Ministry of Defence (MoD).
- Developed under the Buy (Indian) category at a cost of ₹2,402 crore.



SANJAY is an automated system which integrates the inputs from all ground and aerial battlefield sensors, processing them to confirm their veracity, preventing duplication and fusing them to produce a common surveillance picture of the battlefield over secured Army Data Network & Satellite Communication network. It will enhance battlefield transparency and transform the future battlefield through a centralised web application which will provide inputs to Command & Army Headquarters and the Indian Army Decision Support System.

Salient features

- Integration of data from ground sensors and aerial platforms, providing comprehensive situational awareness.
- Support network-centric warfare which are crucial for modern military engagements.
- Transformational impact by leveraging cutting-edge technology to ensure effective monitoring and response capabilities in future battlefield operations.

Conclusion

'SANJAY' marks a significant step towards modernising India's defence capabilities by aligning with global advancements in military technology.

It will monitor the vast land borders, prevent intrusions, assess situations with unparalleled accuracy and prove to be a force multiplier in intelligence, surveillance and reconnaissance.

This would enable commanders to operate in both conventional and sub-conventional operations in a network centric environment.

Col Shashidhar M V (Retd)

Record domestic defence production

Introduction

Over the past decade, India's defence sector has witnessed a remarkable transformation from being largely import-dependent to one increasingly focused on self-reliance and indigenous production in our continuous quest to being a formidable military power globally.

Our defence budget which stood at ₹2,53,346 crore in 2013-14 has witnessed a significant rise reaching ₹6,21,940.85 crore in 2024-25 thus reflecting a clear commitment to strengthening the nation's defence capabilities.

Cornerstone to this transformation is the growth of India's defence manufacturing industry which has become an integral part of the economy. The "Make in India" initiative and policy reforms by GoI have actively promoted domestic production and reduced reliance on foreign procurement.

India's broader vision of achieving ***atmanirbharta*** (self-reliance) in defence, positioning the nation as an emerging hub for production of advanced military technologies and equipment has been the key drivers of growth.

In FY 2023-24, India's defence production hit a record high of approximately ₹1.27 lakh crore marking a substantial increase from previous years. This growth is attributed to effective government policies aimed at promoting indigenous manufacturing.

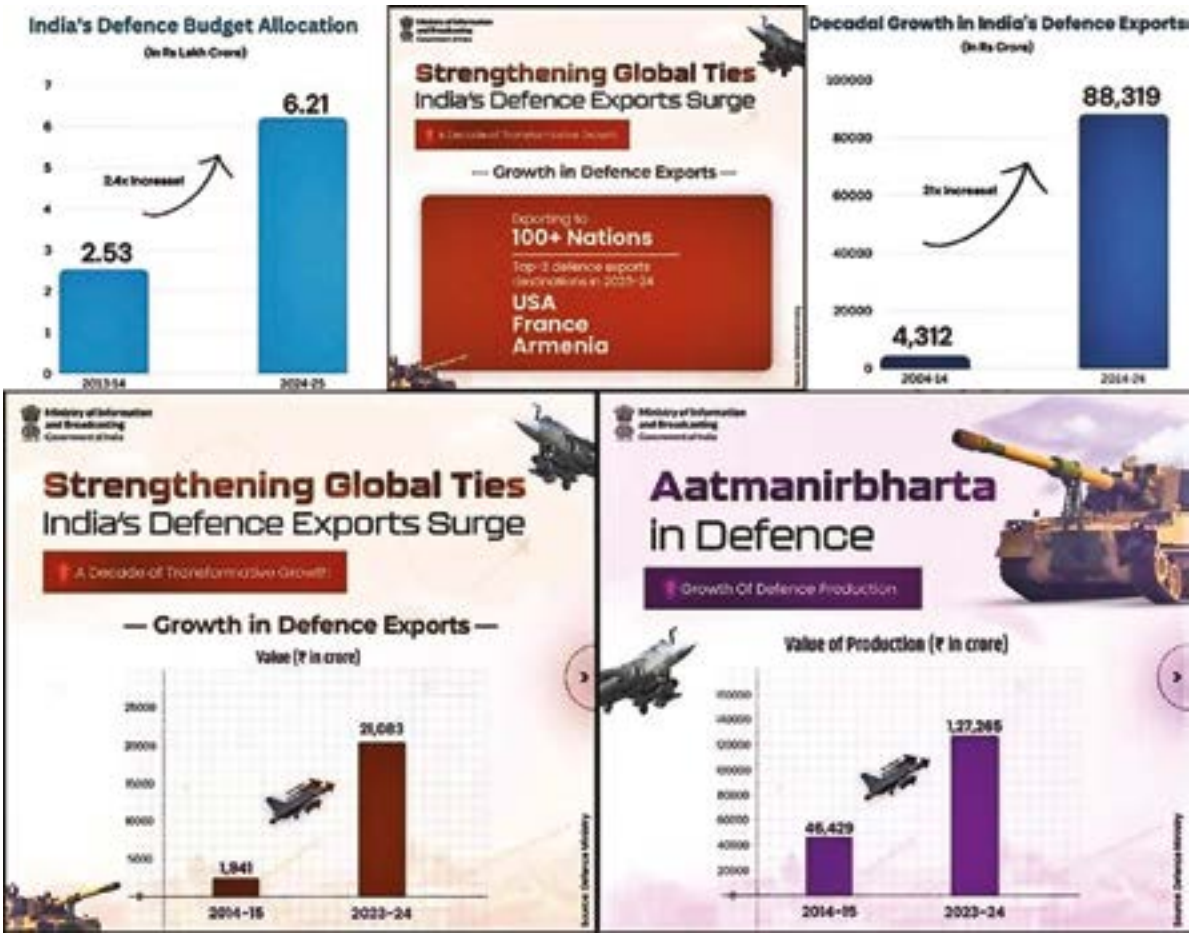
It is projected to achieve a 20% annual growth rate in defence production during the fiscal years 2024 to 2029 with ambitious targets to enhance self-reliance in defence manufacturing.

The MoD has outlined plans for defence production to reach ₹1.75 lakh crore in FY 2025 and further growing to ₹3 lakh crore by FY 2029 reflecting a significant commitment to bolstering the country's defence capabilities and reducing reliance on imports.

Implementation of Defence Production Policy 2018

Milestones

- The cap on foreign direct



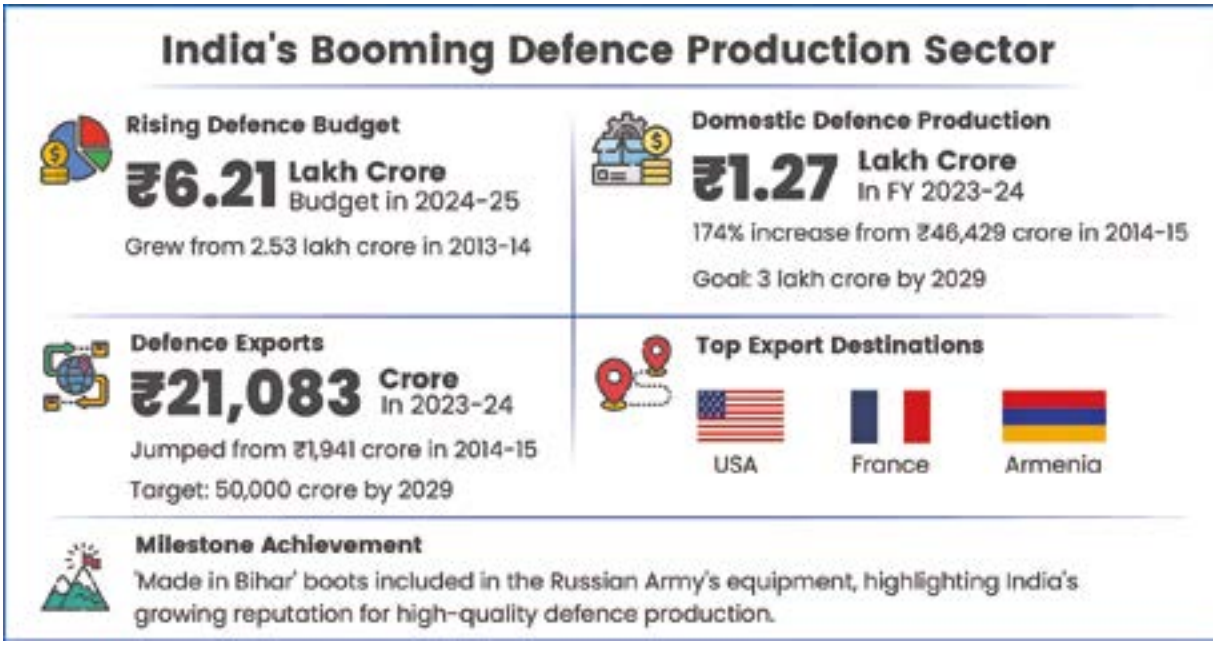
investment (FDI) in defence originally was fixed at 26% in 2001.

- **2010-** the Department of Industrial Policy and Promotion (DIPP) suggested the removal of the cap altogether.
- **2013-** Commerce Ministry also recommended raising the FDI cap to 74%.
- **2014-** The cap was raised to 49%.
- **2018-** MoD released the new Draft Defence Production Policy 2018 (DProP 2018).
- **2020-** the FDI ceiling in the defence sector was raised to 74 % via the automatic route for companies seeking new defence industrial licenses.

Important takeaways

Vision: To make India belong to the top five countries in the world in Aerospace and Defence industry through increased indigenisation of defence production both for purposes of self-reliance and to widen own export to other nations.

- Reduce current imports and achieve self-reliance by domestically designing and manufacturing fighter aircraft, medium lift and utility helicopters, warships, missile systems, surveillance systems, arms & explosives etc., by the year 2025.
- Increase participation of MSMEs, start-ups and other players from the private sector in the defence industry and enable portals and platforms such as 'Competency Mapping', 'Defence Investor Cell' and 'Technology Perspective Capability Roadmap' to facilitate indigenisation of defence production.
- Ensure India is a "top destination for Research & Development (R&D) in the world."
- Liberalise licenses and FDI regime to defence sector.
- Create open competition by opening the sector to private players as a driving force for increased productivity and innovation.
- Accelerate domestic defence production and make it feasible to have own market to attract more investors which eventually will lead to massive market creation.
- Enable greater interaction between private and public sector by adopting technologies both from Ordnance Factory Board, Defence Public Sector Undertaking and private players.



- Embark by planning to export defence goods worth USD 5 billion to other nations by setting up Defence Export Organisation in partnership with the industry and markets.

Record domestic defence production

India has achieved a record ₹1.27 lakh crore in domestic defence production thus highlighting our nation's increasing self-reliance and marking us as a major player in the global defence manufacturing landscape.

India is now aiming for ₹1.60 lakh crore in domestic defence manufacturing production by fiscal year 2026 and thus reducing import dependency as a global defence hub with approximately 65% indigenous defence equipment.

Major defence platforms such as the **Dhanush** Artillery Gun System, Advanced Towed Artillery Gun System (ATAGS), Main Battle Tank (MBT) Arjun, Light Combat Aircraft (LCA) TEJAS, submarines, frigates, corvettes and the recently commissioned INS Vikrant have been developed as part of the Make in India initiative.

India's defence exports have grown from ₹686 crore in FY 2013-14 to ₹21,083 crore in FY 2023-24. India currently exports to over 100 countries including USA, France and Armenia. The country's export portfolio includes bulletproof jackets and helmets, Dornier (Do-228) planes, Chetak helicopters, quick interceptor boats and lightweight torpedoes.

Roadmap ahead

The ambitious targets set for defence production reflect India's strategic vision to become a self-sufficient defence manufacturing hub.

With ongoing investments in research and development and an emphasis on indigenisation, India is well-positioned to reach this target.

Col Shashidhar M V (Retd)

Excercise Winged Raider

Rewind

- The Indian Army and IAF conducted the biggest airborne exercise called the 'Winged Raider' in January 2020.
- The multi-dimensional exercise was preceded by a series of intense preparation by involving movement of special forces and transport aircrafts for the first time ever in the North-Eastern theatre.
- The exercise conducted had over 500 soldiers of the Special Forces parachuting from C-130 Hercules and C-17 Globemaster transport aircrafts besides Dhruv helicopters both during day and night.

Recent exercise in February 2025

The recent exercise focused on special airborne operations between the Army and Air Force demonstrating a high level of operational readiness and inter-service synergy in the Eastern theatre.

- The exercise involved rehearsing various airborne insertion techniques from both fixed-wing and rotary-wing aircraft, enhancing the skills of participating personnel.
- The exercise also witnessed a first in terms of training on airborne operations from the Chinook Helicopter.

Operational pay-offs

The clockwork precision and seamless integration between the Army and IAF in a difficult terrain demonstrated the operational readiness of our paratroopers and air warriors to undertake airborne missions. This

- provided a valuable opportunity for troops to hone their expertise in operations, essential for rapid deployment and mission readiness.
- highlighted the critical role of airborne forces in modern military employment, enabling swift and decisive action in diverse operational environments.
- integrated training programme and precision coordination between the Army and IAF in North Eastern theatre indicating the shift in the Army's focus towards the frontier with China.

Conclusion

The successful completion of the exercise reinforces the commitment of both arms of the military to maintain a high level of preparedness by fostering collaboration in the face of evolving security challenges. **Such training initiatives are significant and imperative in the changing world order as it calls for the nation's defence forces to remain agile, adaptable and ready to respond to any contingency.**

COMPETITION LAW CASE SUMMARIES

In this edition of the series, we will gain an insight into some interesting judgments of the Competition Commission of India ("Commission") pertaining to competition law, to understand how the authority has dealt with the concepts of anti-competitive conduct and abuse of dominance under the Competition Act, 2002 ("Act").

Case summary 1 - Shamsher Kataria v. M/s. Honda Siel Cars India Ltd. (2014)

Facts of the case

The informant alleged that certain companies in the automobile industry were indulging in anticompetitive practices by way of actions including:

(a) not allowing genuine spare parts to be freely accessible in the open market,

(b) regulating operations of authorised workshops and service stations who sell the spare parts,

(c) placing restrictions on the availability of genuine spare parts and the technical know-how to effectively repair, maintain or service the automobiles manufactured by them.

Findings

The Commission found that car manufacturers, by restricting independent repairers / garage owners from accessing spare parts and repair tools of their brands, ensure that their authorised dealer network is the only available service option for their customers. Such foreclosure of competition allows such companies to exploit their monopoly by charging high prices for the spare parts and repairs.

Decision

The actions of the respondents, due to the reasons described above, were found to be a violation of (a) Section 3(4) of the Act, 2002 ("Act"), which states that agreements amongst enterprises / persons, including those at different stages of the production chain, shall be prohibited, if they cause or are likely to cause an appreciable adverse effect on competition in India, and (b) Section 4 of the Act, which prohibits abuse of dominant position by enterprises or groups.

Case summary 2 - All India Online Vendors Association ('AIOVA') v. Flipkart India Private Limited & others (2019)

Facts of the case

It was alleged that Flipkart sold goods to an entity which was owned by Flipkart Internet until 2012, at a discounted price and the goods were subsequently sold on Flipkart's Internet's platform, which amounted to preferential treatment accorded to certain sellers.

Further, it was alleged that Flipkart was using its dominance in one market to enter into another market, i.e., that of manufacturing products.

Findings

The Commission observed that there were multiple players in the market of online marketplace platforms, and though the size and resources of Flipkart were large, no single player held a dominant position in the market and therefore, the question of abuse of dominance did not arise.

Decision

The Commission opined that since their arrangements/ agreements were

(a) not exclusive,

(b) did not impose restrictions on resellers selling their product through Flipkart's platform, and

(c) were compliant with the applicable laws such as the foreign exchange management framework, there was no abuse of dominance established in this case.

Natural remedies for holistic weight management

Weight management, when approached holistically, transcends the narrow focus of mere calorie counting or regimented exercise routines. Indian naturopathy, deeply rooted in the ancient practices of Ayurveda and traditional healing, advocates a comprehensive method that harmonises the body, mind and spirit. **This approach emphasises not only physical activity but also a balanced diet, mental well-being, a healthy gut environment and practices like yoga to achieve and sustain an ideal weight.** By integrating these natural remedies, individuals can experience transformative health benefits that promote overall wellness and sustainable weight management.

Diet and its role

One of the pillars of Indian naturopathy is the Ayurvedic diet, which focuses on the concept of balance among the three *doshas*: *Vata, Pitta* and *Kapha*. Each individual has a unique combination of these energies; imbalances can lead to various health issues, including weight gain or loss. In the context of weight management, the Ayurvedic diet encourages eating according to one's constitution. Foods are classified based on their qualities—such as hot, cold, heavy or light—and consuming a diet that is appropriate for one's *dosha* helps maintain the body's equilibrium.

For instance, *kapha*-dominant individuals, who are predisposed to weight gain due to a naturally slower metabolism and heavier constitution, benefit from a diet rich in light, spicy and dry foods. These include bitter greens, turmeric, ginger and black pepper, which help stimulate digestion and metabolism. Conversely, those with a *pitta* constitution, who may experience inflammation and heat, are advised to include cooling foods like cucumbers, melons and leafy greens. *Vata* types, often prone to irregular digestion and low appetite, should focus on warm, moist and nourishing foods.

The Ayurvedic approach also recommends mindful eating practices—such as eating in a calm environment, avoiding gadget watching and chewing food thoroughly—which aids in proper digestion and prevents overeating.

Mind health: The psychological component

Indian naturopathy holds that the mind and body are intrinsically linked, and mental health significantly influences physical well-being. Stress, anxiety and depression are known contributors to weight gain and other metabolic disturbances. Practices rooted in Indian tradition such as meditation and mindfulness, are central to maintaining mental equilibrium. Regular meditation helps reduce cortisol levels—a stress hormone linked to weight gain—thus creating an internal environment conducive to weight loss and overall health.

Mindfulness, a practice that involves being present in the moment and fully aware of one's thoughts and actions, is another vital tool. By adopting mindfulness, individuals can better understand their eating habits, recognise emotional triggers that lead to overeating and develop healthier responses to stress. Techniques like deep breathing, progressive muscle relaxation, and guided imagery further aid in reducing stress and enhancing mental clarity.

As mental health improves, the body's physiological systems—including digestion and metabolism—function more optimally, thereby facilitating better weight management.

Gut health and the importance of probiotics

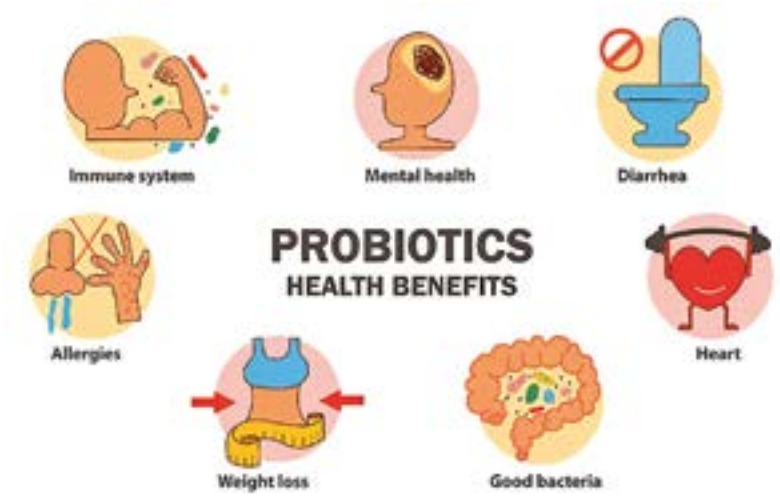
Modern research has of late increasingly recognised the gut as a critical player in overall health, including weight management. Indian naturopathy has long understood the importance of a healthy digestive system. According to Ayurvedic principles, a robust digestive fire—known as "*Agni*"—is essential for breaking down food and assimilating nutrients effectively. An imbalance in gut health can lead to improper digestion, inflammation and weight gain.

Probiotics, the beneficial bacteria and yeast found in fermented foods, play a crucial role in maintaining a healthy gut microbiome. Traditional Indian foods such as curd (yoghurt), *lassi, idli* and *dosa* are rich in these good bacteria.

Regular consumption of these foods not only improves digestion but also helps regulate metabolism and control appetite. Probiotics aid in reducing gut inflammation and ensuring that the body absorbs nutrients efficiently, which in turn helps manage weight. In addition, a balanced gut flora can influence mental health by affecting the gut-brain axis, thereby reinforcing the benefits of a holistic approach to weight management.

To further enhance gut health, Indian naturopathy often recommends the use of herbal supplements and spices known for their digestive benefits. For example, turmeric, with its active ingredient curcumin, has powerful anti-inflammatory properties that support gut health.

Similarly, ginger is known for its digestive and anti-inflammatory benefits, making it a staple in the Ayurvedic diet. Together, these natural remedies ensure that the digestive system operates smoothly, thereby contributing significantly to overall weight management.



Yoga: uniting body, mind and spirit

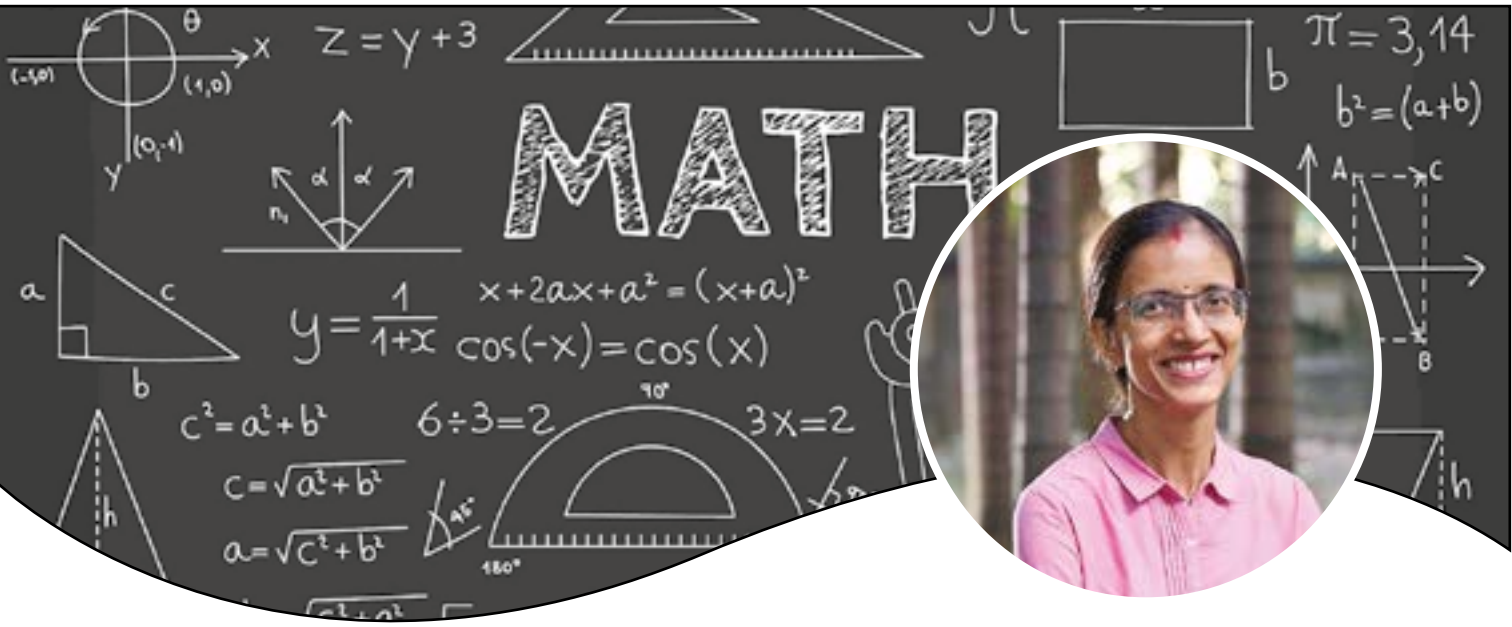
Yoga is perhaps the most renowned export of Indian traditional wisdom, celebrated worldwide for its physical, mental and spiritual benefits. In the context of weight management, yoga provides a dual advantage. Physically, yoga involves a series of postures (*asanas*) and breathing exercises (*pranayama*) that help tone muscles, enhance flexibility and stimulate the metabolism. Regular practice of yoga can improve cardiovascular health and facilitate the burning of calories in a gentle yet effective manner.

Mentally, yoga is a meditative practice that promotes relaxation and stress reduction. The focus on breathing and mindful movement helps alleviate anxiety and promotes a sense of calm, which is crucial for maintaining healthy eating habits and a balanced lifestyle. Yoga also encourages self-discipline and mindfulness, making practitioners more aware of their bodily needs and more in tune with natural hunger cues. This awareness can prevent emotional eating and foster a healthier relationship with food.

Moreover, specific yoga poses, such as the *surya namaskar,* have been identified as particularly beneficial for weight loss. These sequences help increase heart rate, improve circulation and activate multiple muscle groups, making them a comprehensive workout for the body. Additionally, practices like meditation and *yoga nidra* (a deep relaxation technique) are known to reduce stress-induced hormonal imbalances that can lead to weight gain.

Integrating natural remedies

The true strength of Indian naturopathy lies in its holistic approach—addressing weight management not just as a physical challenge but as a complex interplay of diet, mental health, gut flora and physical activity. **By integrating these natural remedies, individuals can create a balanced lifestyle that supports both physical and emotional well-being.**



Dr. Neena Gupta

Our country has always been a land that encouraged education - mathematics, literature, observational astronomy, metallurgy, Ayurveda, Siddha and many other branches of indigenous knowledge. Even *Sangam* period boasts of women poets, thinkers, scholars and advisors to kings. Separated by time and distance, but connected by the ethos of the soil, no wonder we find the Ramanujan prize awardee Dr. Neena Gupta resonating the same sentiment, "it doesn't matter if you are a boy or a girl; God has given the same abilities to both; it's up to us to recognize our abilities, do the hard work, be patient and taste the success, be it mathematics, space science, cooking or nursing."

Born on 24th November 1984 in a modest Indian family in Kolkata, Neena completed her B.Sc. Honours in Mathematics at Bethune College (Kolkata) in 2006. "Most girls in our community get married right after graduation. But, my dad let me get a PhD. He never questioned my life choices—and my husband continues to extend the same support." says Dr. Neena thanking her family for their support and consistent encouragement. Neena recollects her mother teaching them and her father spending most of his family time with Neena and her brothers shooting mental maths questions and puzzles when they were in school. This informal learning honed her capacity to face intriguing problems and gave her joy to solve challenges.

Neena came to know of the ambitious MMath (Master of Mathematics) programme at ISI Kolkata and got selected after a tough all India admission test. Neena identifies her admission to this programme as the definitive turning point in her becoming a mathematician. Prof. Amartya who taught her algebra, commutative algebra and algebraic geometry then and guided her through doctoral research writes, "I have been a witness to the swiftness with which she assimilated the course requirements in a short time. During her second year, she even attended some of our expository research seminars in algebra during vacations or when she did not have classes. At ISI, Neena had a glimpse of the world of higher mathematics and felt the urge to belong to it as a researcher. Her parents too encouraged her to pursue her passion."

With Shyama Prasad Mukherjee Fellowship of CSIR, Neena decided to join ISI Kolkata

for her PhD in 2008 under the supervision of Professor Amartya Kumar Dutta and completed her research by 2011. Some of her significant discoveries include **new algebraic characterisations of affine two and three spaces**. Soon, she started teaching at ISI as a DST-INSPIRE faculty in 2012 and was recognised as a visiting fellow at TIFR Mumbai for her extraordinary contribution towards research.

Zariski cancellation conjecture has been a fundamental problem in algebraic geometry posed by one of the most eminent founders of modern algebraic geometry, Oscar Zariski in 1949. In very simple terms, this can be rephrased as, "if you have cylinders over two geometric structures, and these have similar forms, can one conclude that the original base structures have similar forms?" This could not be solved for decades, though a few attempted it. Dr. Gupta's solution for solving this daunting problem is described as "one of the best works in algebraic geometry in recent years done anywhere."

She made history by being the first person to solve the world's most significant math problem. She became an associate professor at Indian Statistical Institute (ISI) at a very young age, thanks to her world-class accomplishment. Neena has won countless awards and honours for her innovative works that have a big impact in the field of algebraic geometry.

ACCOLADES

2013 - Saraswathi Cowsik Medal from the Tata Institute of Fundamental Research alumni association.

2014 - Young Scientists Award of the Indian National Science Academy.

2015

- **Ramanujan Prize** by the Ramanujan Institute for Advanced Study in Mathematics.
- **A.K. Agarwal Award** for the best publication by the Indian Mathematical Society

2017 - B. M. Birla Science Prize in Mathematics.

2019 - Shanti Swarup Bhatnagar award - the most prestigious prize of our country in the field of science and technology. She was the youngest recipient.

2021 - DST-ICTP-IMU Ramanujan Prize for Young Mathematicians from Developing Countries by International Centre for Theoretical Physics (ICTP), Italy. This was in recognition for her outstanding work in affine algebraic geometry and commutative algebra, in particular for her solution of the Zariski cancellation problem for affine spaces.

It is an extraordinary honour for Neena as she is the fourth Indian and third woman to win this prize.

2022

- **Nari Shakti Puraskar** by the President of India.
- **Ganit Ratna** award - a new prize in mathematics of the Professor Thakare Felicitation Institute.

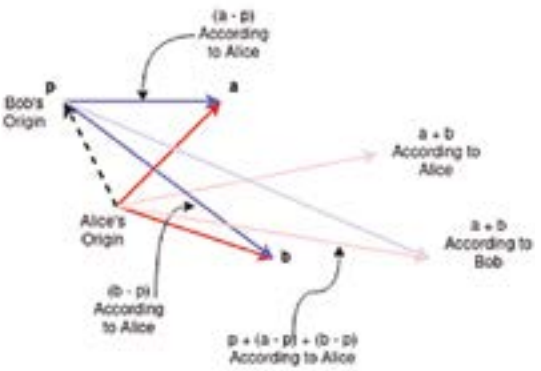
2023 - TWAS-CAS Young Scientist Award for Frontier Science, the first recipient in the category of `Mathematics and Artificial Intelligence'.

2024 - The Infosys Prize

She has received almost all the awards in this field in the last two decades, as a Mathematician!

As a tribute to the great Emmy Noether who has shaped modern abstract algebraic thinking, the annual Emmy Noether Lecture series was established in 1980 by the Association for Women in Mathematics (AWM) to honour women "who have made fundamental and sustained contributions to the mathematical sciences". It is a matter of pride for the Indian mathematical community that Neena Gupta **delivered the Emmy Noether Lecture** in 2025. She is **the youngest** mathematician so far, and is also **the first from an Indian institution** and **the third of Indian origin** to be chosen for this honour.

Her mentor Prof. Dutta in his biographical note about his student observes, "Alongside her research and other mathematical duties, Neena has been performing all her family responsibilities, especially taking personal care of her little daughter. She is deeply religious, and personally I feel that rigour, dedication and intensity in her mathematical life have come to her naturally from the meticulousness, discipline and devotion in her religious life from early childhood. It has been deeply rewarding to be a witness to the rapid evolution in her maturity as a human being, alongside her rapid progress in mathematics".



Affine space is characterized by a notion of pairs of parallel lines that lie within the same plane but never meet each other (non-parallel lines within the same plane intersect in a point).

Shani Pandya

By reducing the land requirement from an expansive 2,200 square feet to just 2 square feet, we are redefining how urban spaces can be utilised.

Imagine a world where space constraints no longer limit our energy possibilities, and with just a sliver of land, households generate clean energy for decades!

Gujarat-based Shani Pandya offers precisely this with his innovative **'solar trees'.**

A revolution in urban energy requirements, the innovative solar trees and tiles drastically reduce land requirements and make power generation feasible for densely populated areas. And the best part- these marvels are not your typical solar panels that demand vast expanses of terrain; instead, they spread vertically, much like real trees. Standing tall and sleek, each solar tree can elegantly host up to 45 solar modules on a single pole. **In simple terms, a solar tree with a capacity of 20 kilowatts can power six Indian homes in a day!**

By reducing the land requirement from an expansive 2,200 square feet to just 2 square feet, we are redefining how urban spaces can be utilised. This ground-breaking innovation is turning heads and changing perspectives.

It is noteworthy that this pioneering concept has not only sparked interest but also action from municipalities, hospitals and government projects.

- Gandhinagar Smart City, for example, has integrated these vertical structures into its cityscape to efficiently manage street lighting costs.

A substantial challenge that solar energy faces is extensive land requirement. For instance- A solar power plant set up on six acres of land (The cost of land was more than ₹100 crore), and the plant alone costs 10 crore).

The land cannot be used for any other activity for the next 30 years.

A defining moment came when Shani Pandya engaged with the planners of Gandhinagar Smart City, who faced hurdles in integrating solar due to limited space.

The experience motivated him to explore ways in which solar energy could be harnessed in densely populated urban areas without consuming valuable ground space. His quest pushed him to create the 'solar tree': a striking innovation that maximises energy production while minimising land usage.

These trees, once installed, can generate enough electricity to power multiple households and street lights daily. Such solar trees were already being used in the USA, but only for beautification purposes, or for WiFi and charging phones. With over 150 solar trees already sprouting across cities from Mumbai to Jammu, Shani is leading an exciting movement toward redefining urban energy landscapes.

Another of Shani's notable innovations is the **solar tile**. With a 20-watt capacity per tile, 150 tiles can provide sufficient power for a typical household.

These tiles can withstand weight and weather — perfect for rooftop installations without sacrificing living areas.

WHAT IS SOLAR TILE?

The solar tile incorporates over 350 single-use plastic wrappers, transforming waste into a source of renewable energy. These eco-friendly tiles not only generate energy but also tackle our plastic waste issue. Each solar tile reduces 25,000 single-use plastic waste while offering energy benefits. This innovative approach not only addresses the pressing issue of plastic pollution but also contributes to India's renewable energy goals. While currently not subsidised, the government is considering support for this eco-friendly technology in the near future.

The tile's versatility extends beyond solar energy generation, as it can be used for residential rooftops, footpaths and smart city infrastructure, including e-mobility charging stations. One of the tile's standout features is its durability. Despite weighing only 3 kg, it can withstand foot traffic without damage, making it suitable for various applications.

This blend of innovation and grit has seen Shani being recognised on a national scale. He recently met PM Modi at the fourth Renewable Energy Investor Meet where he presented the innovative solar tile to him.

Naib Subedar Bana Singh

Naib Subedar Bana Singh is one of India's three living Param Vir Chakra awardees, symbolising extraordinary courage. Born on 6th January 1949, in Kadyal, Jammu, he grew up in an agricultural family as the eldest of eight siblings. His deeply religious upbringing instilled values of integrity and humility. When reflecting on his heroics, he emphasises that anyone could have acted similarly; it was simply his destiny to lead.

He enlisted in the Indian Army on 6th January 1949, training at the High-Altitude Warfare School in Gulmarg and serving with the 8 JAK LI. He undertook the daunting task of capturing Quaid Post at Siachen, at an altitude of 21,153 feet, overcoming fierce enemy resistance and harsh conditions. His bravery earned him the Param Vir Chakra, India's highest military honour.

The Jammu and Kashmir Light Infantry (JAK LI) is an infantry regiment of the Indian Army, established from local militia formed in 1947 to counter Pakistani intrusions.

The militia distinguished itself in the 1965 and 1971 Indo-Pak Wars, earning three battle honours. In 1972, it became a full regiment and was renamed JAK LI in 1976. The regiment has served in various operations, including the Indian Peacekeeping Force in Sri Lanka and the United Nations Mission in Somalia. Notably, in 1984, JAK LI was deployed to the Siachen Glacier and captured a significant Pakistani post at 21,000 feet.

Pakistan established a post named Quaid Post in Bilafond La, Indian territory, prompting India to launch Operation RAJIV to capture it. The operation was named after Second Lieutenant Rajiv Pandey, who led a team to seize a feature called Left Shoulder but was killed during the final assault on 29th May 1987. Quaid Post, situated at 21,153 feet, has a steep ice wall that makes it easily defensible. In June 1987, Naib Subedar Bana Singh volunteered for a task force, climbing the challenging wall with four others while the rest of his battalion diverted Pakistani attention.

Harsh weather conditions hindered their efforts, causing support weapons to malfunction.

Amid heavy snowfall, Naib Subedar Bana Singh and his team stealthily approached and attacked an enemy post, overcoming the misfortune of finding the frozen bodies of fallen comrades along the way. Dividing his group, he lobbed grenades into bunkers and used a bayonet to kill seven Pakistani SSG commandos, causing the rest to flee. Joined by more of his unit, they successfully captured the post, which was renamed **"Bana Top."**

Smt Ramamani N

Bhimavva

The esteemed puppeteer **Bhimavva Doddabalappa Shillekyathar** (96) from Koppal district in Karnataka has been honoured with the prestigious Padma Shri award, one of India's highest civilian honours, for her remarkable contributions to the field of art. Her unwavering dedication to ***Togalu Gombeyaata*** (leather puppetry) and her profound passion for this art form have sustained her for nearly a century. As the daughter of Sanjeevappa and Somamma, Bhimavva, who is unschooled, was born in 1929 in Moranal village. She has become a torchbearer for *togalu gombeyaata,* preserving an art that has been lovingly passed down through generations.

Beginning her journey into leather puppetry at the age of 14, Bhimavva has beautifully depicted 18 episodes of the Mahabharata in leather puppets, including monumental events such as Kurukshetra, *Virata Parva, Lavakusha Kalaga, Karna Parva, Draupadi Vastrapaharana, Adi Parva* and *Sarpa Parva.*

She cherishes and maintains puppets that are over 200 years old. Skilled in every aspect of this art form, Bhimavva captivates audiences with her traditional *gombeyaata* performances. She continues to sing episodes from the Ramayana and Mahabharata from memory, effortlessly adjusting the tunes to complement the rhythm of her puppets.

Recognition abroad

Bhimavva's talent has also gained international recognition, as she has performed in countries such as the United States, France, Italy, Iran, Iraq, Switzerland and the Netherlands. Through her mesmerising performances of the Ramayana and Mahabharata, alongside contemporary themes, she proudly upholds the rich art, culture and heritage of India.

Accolades

In addition to the Padma Shri, Bhimavva has received several other honours, including: -

- **Tehran Country Puppet Festival Award** in 1993.
- 63rd **All India Kannada Sahitya Sammelana** Award.
- **Regional Stage Arts Study** Award.
- **Janapada** Awards.
- **Bayalata Academy Award** for 2005-06.
- **Sangeet Natak Academy Award** in 2010.
- **Rajyotsava Award** in 2014.
- **Janapada Shri Award** in 2020-21.
- **Senior Citizen Award** in 2022.

DO YOU KNOW ?

- **Leather puppetry is a traditional art form that combines painting, leather craft and storytelling. It is also known as *tolu bommalata,* which means "The dance of leather puppets" in Telugu.**
- **It reached its pinnacle during the rule of the Vijayanagara Empire.**

Smt Vaishnavi V

Bhopal

CURIOSITY CORNER

I Quick Five! Choose one or more options as appropriate.

1 Located in this state - _____ (Odisha, Madhya Pradesh, Chhattisgarh, Jharkhand)

2 Founder of the city - _____ (Gorakhdas, Nawab Khan Bahadur, Madan Shah, Raja Bhoj)

3 Rivers that flow through the city - _____ (Narmada, Mahi, Betwa, Tapi)

4 Largest lake in the city - _____ (Chhota Talaab, Bhojtal, Motia Talaab, Sarangpani lake)

5 Languages spoken here - _____ (Hindi, Marathi, Sindhi, Urdu, Gujarati)

II Crossword

Across

4. This National Park located on the banks of Upper Lake is a shining beacon in conservation and eco restoration.

7. Wildlife sanctuary near Bhopal known for tigers.

8. One of the largest mosques in India is located here.

9. Plateau on which the city is located.

Down

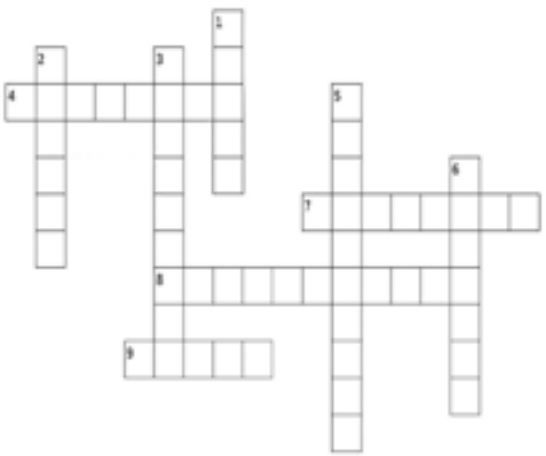
1. This dam is one of the major sources of water for the city; is a popular picnic spot too.

2. Classical dance form that is promoted in cultural festivities of the city.

3. This UNESCO World Heritage Site near Bhopal is known for its sources from Paleolithic and Mesolithic periods.

5. Cave temple on Idgah Hill comprising 7 natural caves near Bhopal.

6. Bhopal is known for this intricate hand embroidery famous across the country.



III Facts fantastic

1. She was the first female ruler of Bhopal and the widely known golden reign - Begums of Bhopal began and the region was in the hands of female rulers for 107 continuous years (1819-1926).

2. Bhopal is famously known as the 'City of Lakes' because of its numerous natural and artificial lakes being utilized for water supply and adding aesthetic appeal to the city. Do you know the number of lakes in this city?

3. Considered one of the world's worst industrial disasters, leading to thousands of deaths and long-term health consequences for the survivors, this tragic event took place on 2nd and 3rd December 1984. Name the disaster, the company involved and the toxic gas that leaked.

4. Designed by the famous architect and urban planner of India Charles Correa, this architectural multi - arts complex is known for its significant role in promoting Indian arts, literature and culture.

5. This palace is a unique blend of European and Mughal architectural styles. Characterized by its distinct French Gothic style, coupled with elements of Indian architecture, this building stands unique from the other Mughal structures.

Answers on page 66

Padmanabhapuram Palace

Located in the Kanyakumari district of Tamil Nadu, near Kerala's border, Padmanabhapuram Palace was once the capital of the Travancore kingdom. It is administered by the Kerala government. Built in the 16th century, this wooden palace is a masterpiece of traditional Kerala architecture. Unlike stone or brick buildings, the palace is entirely made of wood, showcasing the skill of craftsmen.

Architectural highlights

- **Wooden marvel:** The entire palace is made of teakwood and rosewood, with beautifully carved pillars, doors and ceilings. The polished wooden floors made using a mix of egg white, coconut shell and lime shine even today.
- **Intricate carvings:** The palace is full of intricate wooden carvings depicting flowers, animals and mythological figures.
- ***Mantrasala:*** This hall, where the king met his ministers, is known for its cool interiors and delicately carved wooden ceilings. The windows have mica panes that allow light to pass through but keep the heat out.
- ***Thai Kottaram:*** This is the oldest part of the palace, built in traditional Kerala style with sloping roofs and wooden balconies.
- ***Natakashala:*** This was used for dance and music performances. The hall has beautifully designed pillars and a raised wooden stage.
- **The Clock Tower:** The palace has a 300-year-old clock that still works, making it a fascinating piece of history.

DO YOU KNOW ?

- **No nails used:** The wooden structures of Padmanabhapuram Palace were built without using a single nail. Traditional joinery techniques using wooden pegs and interlocking joints hold the entire structure together.
- **Secret underground passages:** The palace is believed to have had secret underground passages that connected it to other locations, possibly used as escape routes for the royal family during emergencies.

Guggul

A fragile treasure

For centuries, *guggul's* resin has been a cornerstone of Ayurvedic medicine, employed to treat a wide range of ailments, from inflammatory conditions like arthritis to lipid disorders such as high cholesterol.

Commiphora wightii (Arn.) *Bhandari* or *Guggul,* a resilient shrub of the *Burseraceae* family, stands as a vital component of India's arid and semi-arid ecosystems. Its distinctive botanical features and potent medicinal properties have made it a subject of both admiration and concern.

Botanical profile

Guggul is characterised by its thorny, divaricate branches, often terminating in sharp spines with its unique papery bark that peels in thin, scroll-like strips. Young parts of the plant are glandular - pubescent (gland-tipped hairs), adding to its textured appearance. The leaves are 1-3 foliolate, featuring rhomboid-ovate leaflets with serrate-toothed margins.

Small, reddish-brown flowers bloom typically during March and April, followed by the development of red drupes. The most significant botanical aspect is the production of a gum-resin, known as *Indian Bdellium* or *guggul* resin, which is extracted from the stem and branches. This resin is the source of its medicinal value.

Medicinal significance

For centuries, *guggul's* resin has been a cornerstone of Ayurvedic medicine, employed to treat a wide range of ailments, from inflammatory conditions like arthritis to lipid disorders such as high cholesterol. Modern scientific research has validated many of these traditional uses, revealing the resin's potent anti-inflammatory, antioxidant and lipid-lowering properties.

This scientific validation has further increased the demand for *guggul,* placing added pressure on its natural populations.

Ecological role

Beyond its medicinal value, *guggul* plays a crucial role in the fragile ecosystems it inhabits. It provides habitat and sustenance for various wildlife species adapted to arid environments. Its root system helps stabilize soil, preventing erosion in these vulnerable landscapes.

The plant's presence is an indicator of the health of these dry ecosystems.

Threats to survival

The primary threat to *guggul's* survival is unsustainable resin harvesting. Driven by increasing demand, over-extraction damages and kills plants, hindering their natural regeneration. Habitat loss due to agricultural expansion, urbanisation and infrastructure development further exacerbates the problem. In regions like North Gujarat, a stronghold for *guggul*, overgrazing and soil erosion compound these threats, leading to a decline in viable populations.

Conservation needs

The IUCN's "Data Deficient" status underscores the urgent need for comprehensive research and monitoring to assess the plant's true conservation status. Implementing sustainable harvesting practices is crucial. Educating local communities about responsible resin extraction techniques is essential for long-term conservation. Habitat protection and reforestation initiatives are also vital to safeguard *guggul's* future. The survival of *Commiphora wightii* depends on collaborative efforts from researchers, conservationists and local communities.

Shri P Sridhar

Literature 2024

The 2024 Nobel Prize for literature was awarded to Han Kang. She is the **first South Korean woman** and the **18th woman** to bag the prize. It was announced by the Swedish academy in Stockholm.

Early life and successes

Han Kang grew up in the midst of a literary atmosphere. Her father Han Seung was a reputed novelist, hence she was always surrounded by books on literature and music. Her love for song and music is reflected in her literary output.

She started her career in 1993 with the publication of her poems in a magazine devoted to Korean literature. **In a world of maddening specialisation Han Kang's work exhibited intense poetic prose that confronts historical trauma and exposes the fragility of human life.**

Her foray into prose got underway in 1995 with the story collection ***Love of Yeosu.*** Her real breakthrough came with her 2007 novel ***The Vegetarian*** which portrays the violent consequences when its protagonist suddenly refuses to eat meat. Her other notable novels are ***The human acts*** and ***We do not part.***

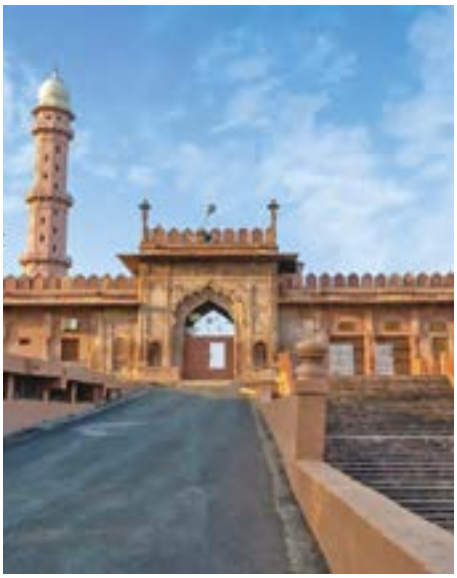
Her style: Experts opine that Han Kang's prose often is characterised by double exposure of pain and correspondence between mental and physical torment, confronting historical traumas and invisible sets of rules and fragility of human life. Anders Olsson, chairman of the academic Noble committee observed "she has a unique awareness of the connections between body and soul, the living and the dead; and in her poetic and experimental style, is an innovator of contemporary prose".

DO YOU KNOW ?

- **Rabindranath Tagore was awarded the Nobel Prize in Literature (1913) for his profoundly sensitive, fresh and beautiful verse, which he expressed in his own English words and made a part of the literature of the West.**
- **Notable literary contributions by Rabindranath Tagore are *Gitanjali* (Song Offerings), *Gora* (Fair-Faced) *and Ghare-Baire* (The Home and the World).**

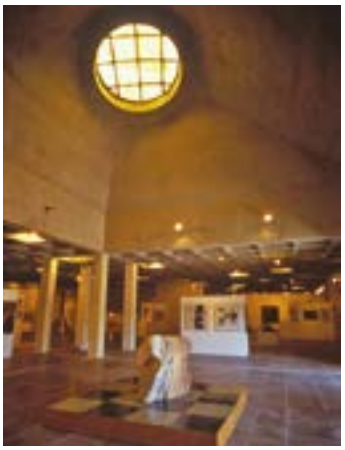
Answers of page 61

I Quick five!



1. Madhya Pradesh
2. Raja Bhoj
3. Betwa
4. Bhojtal (Bada Talaab or Upper Lake)
5. Hindi, Marathi, Sindhi, Urdu and Gujarati

II Crossword



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III Facts fantastic

1. Qudsia Begum
2. 17
3. Bhopal Gas Tragedy, Union Carbide Factory, Methyl isocyanate
4. Bharat Bhavan
5. Shaukat Mahal

Indian News Paper Day

29TH JANUARY

29th January is celebrated every year in India as Indian Newspaper Day, commemorating the launching of the first newspaper, ***Hicky's Bengal Gazette,*** in 1780.

National Productivity Day

12th February

National Productivity Day is celebrated annually on 12th February in India. It is organised by the National Productivity Council (NPC). The day aims to promote productivity culture in India and raise awareness about its importance in achieving economic growth.