UPSC Daily Current Affairs| Prelim Bits 12-06-2025

Cathespsin B

Prelims: *Current events of National and International Importance | Health*

Why in News?

Researchers at the National Institute of Animal Biotechnology (NIAB) have made a significant discovery that could lead to new strategies for extending female fertility.

- **Recent Findings -** The team has uncovered a molecular clue that appears to slow down reproductive aging.
- Using both live mouse models and cultured goat ovaries, they found that reducing the activity of a cellular protein called 'Cathepsin B' (Cat B) helps preserve the ovarian reserve.
- **Ovarian reserve** - It is the finite pool of egg cells (oocytes) that female mammals are born with.
- Unlike sperm, these crucial egg cells *cannot be regenerated*.
- **Declining factors** - Over time, the quantity and quality of the eggs naturally decline because of oxidative stress, inflammation, and general cellular wear, and it accelerates with age.
- **Process -** 'Cat B,' a protein-degrading enzyme, seems to be a key driver of this decline.
- By lowering its levels, the egg loss may be delayed, effectively extending fertility naturally.
- For farmers, a simple intervention to extend the reproductive lifespan of livestock could
    - Improve herd productivity,
    - Reduce stray cattle populations, and
    - Support the incomes of smallholder farmers.
- **Advantages** – It navigates the twin challenges of rural sustainability and reproductive health.

Reference

The Hindu | 'Cathepsin B' (Cat B)

29th meeting of Financial Stability and Development Council (FSDC)

Prelims: *Current events of National and International Importance | Economy*

Why in News?

Union Minister for Finance and Corporate Affairs chaired the 29th meeting of the Financial Stability and Development Council (FSDC), in Mumbai recently.

- **Strategic Framework -** Establishing an appropriate framework by regulators for evaluating and enhancing the *responsiveness of regulations* and subsidiary instructions.
- To take necessary steps to *reduce the unclaimed assets* in the financial sector and the expeditious and seamless refund of such assets to rightful owners.
- Prescribing common KYC norms, simplification and digitalisation of the KYC process,
  - Including digital onboarding for Non-Resident Indians (NRIs),
  - Including PIOs and OCIs, in the Indian securities market.
- Analysing *trends in financing flows* as part of a strategy to increase the investment ratio.
- Taking measures to improve the reach and scope of factoring services and the effective use of account aggregator networks.
- The FSDC deliberated on the emerging trends from the domestic and global macro-financial situation and stressed the need to be vigilant.
- The Council recognised the need for proactive efforts to mitigate potential risks to financial stability while adopting adequate safeguards for the financial system's resilience.
- The members decided to strengthen the inter-regulatory coordination for the wider development of the financial sector.

Financial Stability and Development Council (FSDC)
• **Established in** – 2010. • It serves as a high-level forum aimed at ***enhancing financial stability and inter-regulatory coordination.*** • It is ***not a statutory body*** and does not have a dedicated budget for its operations. • **Chaired by –** The Union Finance Minister. • The council comprises heads of key financial regulators, including the RBI, SEBI, PFRDA, IRDA, and FMC, along with senior officials from the Finance Ministry and the Chief Economic Adviser, with the option to invite external experts as needed. • The FSDC focuses on macroprudential supervision, addressing issues related to financial sector development, and promoting financial literacy and inclusion. • A sub-committee led by the RBI Governor tackles specific matters concerning regulatory coordination and stability.

Reference

PIB | Financial Stability and Development Council (FSDC)

AI-based system to avoid stampede

Prelims: *Current events of National and International Importance | Technology*

Why in News?

Ahmedabad police to use AI-based system during Rath Yatra to avoid stampede.

- It is still in the development stage, and has yet to be named.
- It will ***calculate the density of people*** in a particular area of spanning certain square metres and determine, based on yet-to-be-decided parameters, if a stampede is imminent or not.
- Based on the results of this system, alerts will be sent out to officers to disperse crowds to avoid a stampede.
- The system will use ***thermal imaging and pixel-counting*** to count the occupied and unoccupied areas of a particular space.
- **Main functions - Real-time monitoring** - AI-powered CCTV cameras will continuously analyse video streams in real time.
- **Crowd density estimation -** Algorithms will calculate the number of people in a given area.
- **Thresholding -** Pre-defined threshold values for crowd density will be established. When the detected density crosses these thresholds, it will trigger an alert.
- **Anomaly detection –** It can identify unusual crowd behaviour, such as sudden surges in movement, unusual clustering patterns, fallen individuals, and aggressive movement.
- **Alerting authorities -** Upon detecting a potential stampede risk, the system sends immediate alerts to security personnel or control rooms via LCD displays, GSM messages or other communication channels.
- **Predictive analytics-** Advanced systems will use time-series prediction models to forecast crowd behavior and dynamics based on historical and real-time data, helping anticipate potential bottlenecks or overcrowding.
- **Reinforcement learning -** Algorithms can learn from past incidents to suggest optimal crowd flow routes and alternative evacuation paths during emergencies.
- **Challenges**
    - Limited accuracy
    - Computational complexity and cost
    - Data privacy and ethical concerns
    - Integration with existing infrastructure
    - Human intervention remains crucial
    - Defining thresholds

Reference

The Indian Express | AI-based system to avoid stampede

Spathaspina noohi

Prelims: *Current events of National and International Importance | Conservation*

Why in News?

New beetle species has recently been discovered in Meghalaya forests.

- It is a ***new beetle species*** that features a striking sword-like spine on its back, an anatomical trait so rare.
- **Nomenclature** - Named in honour of P. B. Nooh, IAS, Director of Tourism, Government of Kerala, for his efforts in promoting nature-based tourism.
- **Genus** – It is also classified under an entirely new genus, Spathaspina.
- **Family** – Weevil,part of the large beetle family Curculionidae.
    - Many are known as agricultural pests.
- It was found in the Umran area of Ri Bhoi district in Meghalaya.
- **Features** - It is known for features like a spine-like structure on the thorax and specific antenna formations.
- Beetles in this subfamily are typically identified by their compact bodies, the way they tuck their snouts between their legs when resting, and a specific visible structure from the back.
- **Benefits** - It plays an important role in ecosystems by helping control invasive plant species and maintaining ecological balance.



References

1. North East News | Spathaspina noohi
2. Hub Network | Spathaspina noohi

Padmanabhaswamy Temple

Prelims: *Current events of National and International Importance | History*

Why in News?

Padmanabhaswamy Temple performs rare 'Maha Kumbhabhishekam' after 270 years.

- The Padmanabhaswamy Temple, dedicated to Lord Vishnu, is a significant Hindu temple in ***Thiruvananthapuram, Kerala.***
- **Built in -** The 8th-century, one of the 108 temples in India dedicated to Lord Vishnu.
- King Marthanda Varma that this temple saw a major renovation.
- This was followed by the tradition of *Thripadidanam,* the donation to the temple and its deity.
- **Architecture** - It is renowned for its ***Dravidian architecture***
- Lord Vishnu is in a reclining posture on the serpent God Anantha.
- The interiors of the temple are adorned by exquisite paintings and murals.
- The temple features a 7-tier gopuram adorned with intricate carvings and designs, showcasing remarkable craftsmanship.
- Inside, the temple is embellished with stunning paintings and murals.
- Primarily depicting life-sized images of deities such as Lord Vishnu in a reclining position, Lord Ganapati, Gaja Lakshmi, and Narasimha Swamy.
- The dhwaja stamba, or flag post, stands at approximately 80 feet tall and is covered in gold-plated copper sheets, while the temple houses around 3 million palm leaf manuscripts from the 14th century.
    - It details the administrative and financial history of the temple town and the Travancore kingdom.
- **Hymns** - Nammalwar, a 9th-century poet and one among the 12 Vaishnavite saints of the Alvar tradition, has composed ten hymns in praise of Lord Padmanabha.

Reference

The Hindu | Padmanabhaswamy Temple

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History, Art and Culture

Poson Poya 2025 commemorating Buddhism's Arrival

Recently, Sri Lanka celebrated Poson Poya , marking Buddhism's arrival over 2,000 years ago. This June full moon festival honors Monk Arahat Mahinda's first sermon to King Devanampiyatissa at Mihintale.

• **Occasion-** Monk Arahat Mahinda converted King Devanampiyatissa at Mihintale, the cradle of Theravāda Buddhism in Sri Lanka.

• **Grand 2025 Celebrations** - Mihintale Hill and Anuradhapura host major activities. Streets and temples are adorned with white cloths, lanterns, and almsgiving booths.

• **Enhanced Pilgrim Transport** - Free shuttle trains run between Anuradhapura and Mihintale. Special trains connect Colombo Fort and Anuradhapura for pilgrims.

• **India's Cultural Outreach** - The Indian High Commission in Colombo organized a Buddhist heritage exhibition, fostering cultural ties.

Keeladi Site

Union Culture Minister Gajendra Singh Shekhawat Recently stated the Keeladi excavation report by Amarnath Ramakrishna lacks "technically well-supported" data, requiring further scientific studies.

• **Keeladi -** A Vaigai River Site Keeladi is a village in Sivaganga district, Tamil Nadu, 12 km southeast of Madurai on the Vaigai River, where excavations began in 2015.

• **Rich Artefact Discoveries -** Over 18,000 artefacts, including pottery, inscribed potsherds, gold, copper items, and weaving tools, have been unearthed, indicating a thriving ancient urban settlement.

• **Advanced Urban Civilization** - Findings suggest a well-planned urban center with established industries like pottery, weaving, and bead-making, and evidence of trade networks and leisure activities.

• **Rewriting Sangam Age** - Chronology Keeladi findings push the Sangam Age back to around 800 BCE, suggesting a much older and more advanced Tamil civilization.

• **Potential Indus Valley** - Links Similarities between Keeladi and Indus Valley Civilization symbols hint at possible connections, awaiting further studies to bridge the chronological gap.

Kabir Jayanti

Kabir Jayanti, observed on June 11th on Jyeshtha Purnima, celebrates Sant Kabir Das, a 15th-century mystic poet. It honors his timeless message of universal love, spiritual harmony, and social equality.

• **Sant Kabir** - Born in Varanasi, Kabir was raised by a Muslim weaver couple. His dual heritage shaped his critique of religious dogmas, becoming a prominent figure in the Bhakti movement.

• **Philosophy** - Kabir rejected external rituals, emphasizing inner purity and a formless God (Nirguna Brahman). His "Dohas" promoted humility, compassion, and human equality.

• **Significance** - Kabir Jayanti reaffirms his inclusive spiritual legacy, encouraging introspection, social harmony, and interfaith dialogue.

• **Celebrations** - Across North India, celebrations include prayers, satsangs, bhajans, and community meals. Pilgrims visit his samadhi at Maghar.

• **Lasting Relevance** - Kabir's universal message of unity, love, and humanity remains a guiding light, emphasizing true spirituality in the heart and service to all.

Geography

Fuego Volcano Prompts Evacuations

Guatemalan authorities recently evacuated over 500 people after Fuego Volcano, Central America's most active, spewed gas and ash, prompting immediate safety measures.

• **Guatemala's "Volcano of Fire"** - Known as "Volcano of Fire," Fuego is a prominent stratovolcano overlooking Antigua, Guatemala. It sits on the Pacific "Ring of Fire," a zone of frequent seismic and volcanic activity.

• **Historically Active Volcano** - Fuego has erupted over 60 times since 1524, making it Central America's most historically active. A 2018 eruption tragically claimed 194 lives and left 234 missing.

• **Ongoing Volcanic Manifestations** - Since 2018, Fuego remains active with daily small eruptions, producing ashfall, pyroclastic flows, lava flows, and lahars (volcanic mudflows).

• **Stratovolcanoes** - Are cone-shaped with steep sides and small summit craters. Formed from viscous lava, they are prone to explosive eruptions due to gas buildup.

• **Global Prevalence** Comprising about 60% of Earth's individual volcanoes, stratovolcanoes like Fuego are common. Andesite is their most frequent rock type, though they erupt various rocks.

India's Heat Dome Threat

A recent study reveals that nearly 76% of India's population faces high to very high risk from extreme heat, potentially linked to the Heat Dome Effect.

• **Heat Dome** - Is a meteorological phenomenon where a high-pressure system acts like a lid, trapping hot air beneath it over a region.

• **How it Forms** - As the high-pressure system settles, it compresses the air below, causing it to warm significantly. This trapped air continuously heats up, intensifying the effect.

• **Impact on India** - The study underscores the widespread vulnerability across India, with a vast majority of the population exposed to escalating heat risks due to this phenomenon.

• **Causes of Formation** - Typically, a strong high-pressure ridge in the atmosphere pushes warm air downwards, and as it sinks, it compresses and heats further, creating the dome.

• **Mitigating the Risk** - Understanding and preparing for Heat Domes is crucial for India to implement effective public health measures and climate adaptation strategies to protect its population.

International Relations and Issues

Blue Nationally Determined Contributions Challenge Launched at UN Ocean Conference

The "Blue NDC Challenge," an international initiative, was launched on the first day of the third UN Ocean Conference (UNOC3). Its goal is to significantly boost ocean-focused climate action globally.

• **France and Brazil Lead** - It urges nations to integrate ocean-centric climate measures into their Nationally Determined Contributions (NDCs) before COP30 in Belem, Brazil.

• **Growing International Support** - Six additional countries have joined the challenge: Australia, Fiji, Kenya, Mexico, Palau, and the Republic of Seychelles, demonstrating a broad commitment to ocean climate action.

• **Backed by Key Organizations -** The initiative is supported by Ocean Conservancy, the Ocean and Climate Platform, and the World Resources Institute (through ORCA), and endorsed by WWF-Brazil.

• **Understanding NDCs** - NDCs are national climate plans adopted by 195 Parties under the 2015 Paris Agreement, outlining efforts to reduce emissions and adapt to climate change.

• **Global Temperature Targets** - NDCs aim to keep the global average temperature "well below 2°C above pre-industrial levels" and pursue efforts to limit it to 1.5°C.

Economy

Mathura-Vrindavan Rail Project Canceled

Project Abandoned The Indian Railway Ministry has permanently closed the Mathura-Vrindavan metre gauge to broad gauge conversion project, citing it as "uneconomical" and due to local opposition

• **Project Goal -** The ambitious project aimed to convert the existing century-old metre gauge line between Mathura and Vrindavan to broad gauge, enhancing connectivity.

• **Estimated Cost-** The project was sanctioned in 2017-18 with an estimated cost of **Rs 402 crore**.

• The century-old metre gauge line, which ran a rail bus service until early 2023, was to be replaced.

• **Strong Local Resistance** - Residents opposed the embankment design, fearing it would impede ground-level track crossings. Protests escalated in June 2023.

Environment

Gangotri National Park

Recently, Residents of Uttarkashi have voiced concerns to the Union government regarding a new waste incinerator within Gangotri National Park and the Bhagirathi Eco-Sensitive Zone.

• **Uttarakhand's Himalayan Jewel** - Gangotri National Park, located in Uttarkashi District, Uttarakhand, encompasses the Bhagirathi River's upper catchment and borders Tibet (China) to the northeast.

• **Prominent Peaks -** Within the Garhwal Himalayas, the park features peaks like Chaukhamba I and Kedarnath Main.

• **Gangotri Glacier** - A primary source of the Ganges, lies within its boundaries.

• **Diverse Himalayan Ecosystem** - The park boasts high-altitude Himalayan ecosystems, with Western Himalayan subalpine conifer forests at lower elevations and alpine shrubs and meadows higher up.

• **Rich Wildlife Inhabitants -** It is home to diverse fauna including snow leopards, brown bears, blue sheep, musk deer, Asian black bears, and Himalayan tahr.

• **Adjacent Protected Areas** The park shares borders with Kedarnath Wildlife Sanctuary and Govind National Park, contributing to a larger protected Himalayan region.

Bengaluru: India's Leopard Capital

Bengaluru has become India's 'Leopard Capital' with 80-85 free-ranging leopards, surpassing Mumbai. A year-long HNF survey led by Dr. Sanjay Gubbi confirmed this, highlighting the city's unique ecological value.

• **Why in News?** A 2024-2025 camera-trap survey revealed Bengaluru's leopard population growth, making it the highest among major metropolises. Bannerghatta National Park shows a steady rise, with conservation reserve proposals underway.

• **Survey Aims** - To estimate leopard populations, assess habitat use, and recommend conservation strategies for human-leopard coexistence.

• **Key Findings** - Estimated 80-85 leopards, with 54 in Bannerghatta National Park and ~30 in fringe areas. The survey covered 282 sq km, documenting 34 mammal species, including 8 IUCN Red List species.

• **Reasons for Increase** - Stricter BNP protection, increased prey, and community coexistence contributed to the leopard surge.

• **Conservation Recommendations** - HNF recommends declaring new conservation reserves, adding forest areas to BNP, conserving corridors, avoiding future translocations, and enhancing community awareness.

Science

Shahed Drones

Shahed drones are Iranian-made unmanned combat aerial vehicles (UCAVs) and loitering munitions, primarily developed by Shahed Aviation Industries. Russia designates the Shahed-136 as "Geran-2."

• **One-Way Attack Design** - These drones are designed for single-mission attacks, carrying explosive warheads that detonate upon impact. The widely used Shahed-136 features a delta-wing, weighs about 200 kg, and has a 2.5–3 meter wingspan.

• **Extended Range and Speed -** The Shahed-136 can travel 1,000–2,500 km at up to 185 km/h. It uses disposable rocket boosters for launch, then a piston engine, producing a distinctive "moped-like" sound.

• **Robust Guidance Systems** - Drones utilize pre-programmed GPS or GLONASS coordinates, making them resistant to electronic warfare. Recent variants reportedly incorporate advanced algorithms and AI for enhanced navigation and targeting.

• **Diverse Warhead Options** - Shahed drones can be equipped with various warheads, including high-explosive fragmentation, thermobaric, and shrapnel-filled munitions, maximizing damage to personnel and equipment.

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