



DAILY CURRENT AFFAIRS-

1. Scientists Can Now Shrink and Rewrite Proteins with AI
2. Increase in India's Asiatic Lion Population as of 2025
3. Why does handloom remain a key part of India's economy?
4. Scientists discover unusual ozone layer above North Bay of Bengal

1. Scientists Can Now Shrink and Rewrite Proteins with AI

Source: The Hindu

Why in News?

Scientists at Duke University have developed an AI system called Raygun that can redesign proteins by shrinking, enlarging or rewriting their amino-acid sequences while retaining their functional properties. The technology could address size constraints in gene therapy and improve protein engineering for medicines and biotechnology.

How Raygun Works?

- Raygun uses protein language models to learn the sequence patterns and structural relationships that determine how proteins function.
- The system converts a protein into a standardised mathematical representation and uses this information to redesign its length and sequence.
- The model can reduce protein size by 10–25% and, in some cases, by more than 50%, while attempting to preserve important structural and functional regions.
- The system can also expand proteins, giving researchers greater flexibility in designing proteins for specific applications.

Significance for Gene Therapy

- Gene therapy often relies on viral vectors to transport therapeutic genes into cells, but these vectors have limited capacity for carrying large genetic sequences.
- A protein that performs the required function in a smaller form could therefore make it easier to package therapeutic genes into delivery vehicles.

- The technology could support the development of compact therapeutic proteins as well as applications in drug development, medical imaging and biotechnology.

Scientific Challenge

- A protein's function depends on the precise three-dimensional structure produced by its amino-acid sequence, meaning that simply deleting parts of a protein can destroy its activity.
- Raygun attempts to overcome this problem by learning evolutionary patterns and retaining regions that are important for protein structure and function.
- The approach may be less reliable for artificial modifications introduced by humans because these additions may not have corresponding evolutionary patterns.

Why It Matters?

- The technology shifts AI-based protein design from predicting protein structures to actively rewriting protein sequences while attempting to preserve their functions.
- Successful development could expand the range of proteins that can be engineered for therapeutic and industrial applications.
- The technology also raises concerns about responsible use of AI in biological design, making safeguards and responsible AI-for-biodesign principles important.

UPSC Prelims Practice Question

Q. With reference to the AI-based protein engineering system Raygun, consider the following statements:

1. It uses protein language models to redesign protein sequences.
2. It can modify the length of proteins while attempting to preserve their function.
3. Its applications are limited to agricultural biotechnology.
4. Its development has potential relevance for gene therapy.

Which of the statements given above are correct?

- (a) 1, 2 and 4 only
(b) 1 and 3 only
(c) 2 and 3 only
(d) 1, 2, 3 and 4

Answer: (a)

UPSC Mains Practice Question

Q. How can AI-driven protein engineering address the technological constraints of gene therapy? Discuss its potential benefits and ethical concerns. (10 Marks, 150 Words)

2. Increase in India's Asiatic Lion Population as of 2025

Source: Ministry of Environment, Forest and Climate Change

Why in News?

India's Asiatic lion population increased from 523 in 2015 to 891 in 2025, according to the 16th Asiatic Lion Population Estimation conducted in May 2025. The increase highlights the gains from sustained habitat management, population monitoring and community-based conservation in Gujarat.

Population and Distribution

- The Asiatic lion population increased from 523 in 2015 to 891 in 2025.
- The geographical range of the species expanded from around 30,000 sq km in 2020 to nearly 35,000 sq km in 2025.
- The expanded range now covers 11 districts of Gujarat.
- The Asiatic lion remains restricted to the wild in India, with the Gir landscape forming its principal habitat.

Conservation Measures

- Project Lion, launched in 2020, focuses on habitat improvement, scientific population monitoring, disease surveillance and community participation.
- The 16th population estimation used methods including direct beat verification, high-resolution cameras, camera traps and GPS-enabled radio collars.
- Barda Wildlife Sanctuary is being developed as a second home for Asiatic lions to reduce the risks associated with concentrating the entire wild population in one landscape.

Major Conservation Concerns

- Around 57% of the Asiatic lion population now occurs outside protected areas, increasing the possibility of human-lion conflict.

- The concentration of the entire wild population in the Gir landscape creates a major disease and ecological risk.
- The 2018 Canine Distemper Virus outbreak, which killed 28 lions, highlighted the vulnerability created by geographical concentration.
- Expansion into human-dominated landscapes makes habitat connectivity, disease surveillance and community participation increasingly important.

Conservation Status

- The Asiatic lion is classified as Endangered on the IUCN Red List.
- The species is listed under Appendix I of CITES and Schedule I of the Wildlife Protection Act, 1972.
- The conservation programme aims not only to increase population numbers but also to secure additional habitats and improve long-term genetic and disease resilience.

UPSC Prelims Practice Question

Q. With reference to the Asiatic lion in India, consider the following statements:

1. The Asiatic lion occurs in the wild only in India.
2. Gir forms the principal habitat of India's wild Asiatic lion population.
3. Barda Wildlife Sanctuary is being developed as an additional habitat for Asiatic lions.
4. The Asiatic lion is classified as Endangered on the IUCN Red List.

Which of the statements given above are correct?

- (a) 1, 2 and 3 only
- (b) 1, 2 and 4 only
- (c) 1, 2, 3 and 4
- (d) 2 and 4 only

Answer: (c)

UPSC Mains Practice Question

Q. Despite the recovery of the Asiatic lion population in India, its concentration in a limited geographical range creates ecological and disease-related risks. Discuss the need for habitat diversification and landscape-level conservation. (15 Marks, 250 Words)

3. Why does handloom remain a key part of India's economy?

Source: The Hindu

Why in news?

India's handloom sector, a vital economic and cultural asset, provides livelihoods to 35 lakh weavers, requiring strategic policy support for future growth and global recognition.

Key Highlights:

- **National Handloom Day**, observed on August 7, commemorates the launch of the **Swadeshi Movement** in 1905 and honors Indian weavers.
- The handloom sector provides livelihoods to over **35 lakh weavers** and allied workers across more than **31 lakh households**, with women comprising nearly 70% of the workforce.
- It contributes approximately **15% of India's cloth production** and is a significant source of non-farm employment in rural areas.
- Government initiatives like the **National Handloom Development Programme** focus on skill development, design innovation, and market access.
- There is a strategic shift towards making handloom aspirational for younger generations and expanding its presence in global markets.

Detailed Insights:

- Historically, Indian handlooms were major global industrial enterprises, establishing India's reputation as a manufacturing economy.
- The sector faces challenges such as the gradual extinction of lesser-known weaving traditions and younger generations leaving the profession due to diminishing returns.
- The **National Handloom Development Programme** aims to integrate handlooms with e-commerce platforms and boost export opportunities.
- Successful interventions include the revival of Tangaliya weaving in Gujarat and the growing popularity of Siddipet Gollabhama sarees.



- The **Office of the Development Commissioner for Handlooms**, in collaboration with **UNESCO**, is working to identify and document endangered weaves.
- Future policy aims to reposition handlooms as premium lifestyle products, emphasizing craftsmanship, sustainability, and exclusivity.
- India seeks to leverage its traditional weaves to build its soft power and expand exports, requiring consistent quality and stronger branding.
- There is a need for better measurement of the handloom sector's contribution to GDP, exports, and employment for effective policymaking.
- Handloom is considered a strategic asset for India's future, contributing to rural employment, women's empowerment, and cultural preservation, aligning with the vision of **Viksit Bharat**.

4.Scientists discover unusual ozone layer above North Bay of Bengal

Source: The Hindu

Why in News?

Indian scientists detect unusually high ozone layer over North Bay of Bengal, providing crucial insights into stratospheric transport and atmospheric dynamics.

Key Highlights:

- Scientists detected an unusually high concentration of ozone in the upper atmosphere over the North Bay of Bengal.
- This thick ozone layer was found at an altitude of 21 to 23 kilometres and persisted for more than a day.
- The discovery was made by scientists from institutions including the **Aryabhata Research Institute of Observational Sciences (ARIES)** during the **Phase-I NetRAD-ASMA campaign**.
- The research utilized a countrywide network of atmospheric radars, weather balloons, and satellites like Aura MLS and INSAT-3DR.
- The indigenously developed **Stratosphere–Troposphere (ST) Radar** at **ARIES**, Nainital, was a key instrument in data collection.

Detailed Insights:

- The finding provides quantitative experimental evidence of stratospheric ozone redistribution over the Indian subtropical region during winter.
- The unusual ozone enhancement was primarily attributed to the transport of ozone-rich air, followed by downward atmospheric motion and compression.
- This observation suggests that sunlight-driven photochemical processes were unlikely to be the main cause of the accumulation.
- The study helps researchers better understand how atmospheric circulation and dynamical processes influence ozone distribution in the stratosphere.
- It underscores the value of coordinated observations from atmospheric research facilities across India and the contribution of indigenous technology.

