



Balalatha's

CSB IAS ACADEMY

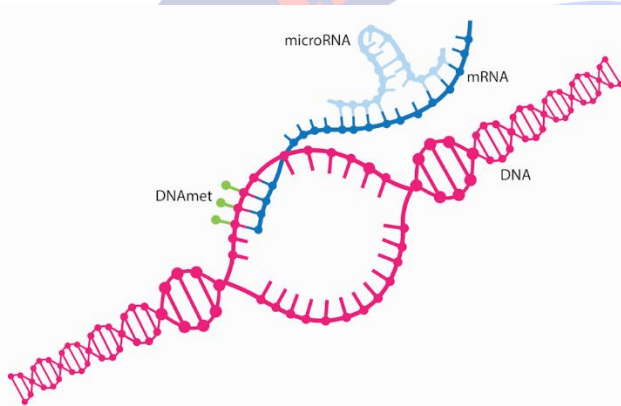
The Road Map to Mussoorie...



Prelims EDGE – 08/10/2024

MICRORNA

Context: Victor Ambros and Gary Ruvkun have received the 2024 Nobel Prize in Medicine, for their discovery of microRNA and its role in gene regulation.



What s MicroRNA ?

- MicroRNAs (miRNAs) are a class of **non-coding RNAs that play key roles in regulating gene expression.**
- Gene expression refers to whether a **particular gene is making too much, too little or the normal amount of its protein** at a particular time.
- Molecules of miRNA are **found in cells and in the bloodstream.**

- They are typically composed of **approximately 21 to 24 nucleotides**, making them **much smaller than messenger RNAs (mRNAs)**, which carry instructions for protein synthesis. Their small size allows them to bind to specific target mRNAs.

How does miRNA control gene expression ?

- miRNA controls gene expression mainly by **binding with messenger RNA (mRNA) in the cell cytoplasm.**
- Instead of being translated quickly into a protein, the mRNA will be either destroyed and its components recycled, or it will be preserved and translated later.
- So, if the level of a particular microRNA is under-expressed (its level in the cell is too low), the protein it normally regulates may be over-expressed (its level will be unusually high); if the microRNA is over-expressed (its level is unusually high), its protein will be under-expressed (its level will be unusually low).

Biological Functions:

- They play **critical roles in various biological processes**, such as growth, cell differentiation, proliferation, and apoptosis (programmed cell death).
- They are involved in maintaining **cellular homeostasis** and responding to environmental cues.
 - Cellular homeostasis is the maintenance of stable conditions in cells.

Disease Implications:

- **Alteration in miRNA expression results in changes in the profile of genes** involving a range of biological processes, contributing to numerous human disorders.

- They play a **role in many cancers**, in carcinogenesis, malignant transformation and metastasis.
 - **Carcinogenesis:** Formation of cancer (uncontrolled development of cells), whereby normal cells also transform into cancer cells. It is also called oncogenesis or tumorigenesis.
 - **Malignant transformation:** Process by which cells acquire properties of cancer. This may occur as a primary process in normal tissue, or secondarily as malignant degeneration of an existing benign (harmless) tumour.
 - **Metastasis:** Spread of cancer from the place where they first formed to another body part. Cancer cells break away from the original (primary) tumour, travel through the blood or lymph system and form a new tumour in other organs or tissues.

About Ribonucleic Acid (RNA)

- ✓ Nucleic acid found in all living cells, made of nucleotides containing **ribose sugars, nitrogenous bases & various phosphate groups.**
- ✓ It is composed of ribose sugar, phosphate, and bases such as **adenine, guanine, cytosine, and uracil.**
- ✓ The **majority of RNA is single-stranded**, but there are some double-stranded RNA viruses. The length and structure of the RNA molecule can vary.
- ✓ Slight structural difference between the sugars in them adds **stability to DNA, making it more suitable for genetic information storage**, whereas RNA's relative instability makes it more suitable for its more short-term functions.

About Nobel Prize:

- ✓ The Nobel Prizes were **established by Alfred Nobel in 1895** and are given to "those who, during the preceding year, have conferred the greatest benefit to humankind."
- ✓ The first Nobel Prize was given in **1901**, and it has been provided for **physics, chemistry, medicine, literature, and peace** almost every year since.
- ✓ In 1968, the **Nobel Prize in Economic Sciences** was established and has been since been awarded by Sveriges Riksbank (Sweden's central bank).
- ✓ Prizes may be given **only to individuals, except the Peace Prize**, which may also be conferred upon an institution. However, 3 individuals at max, can share a prize.
- ✓ All the Nobel Prizes are given in **Stockholm, Sweden** except for the Nobel **Peace Prize which is awarded in Oslo, Norway.**
- ✓ Each Nobel Prize consists of a gold medal, a diploma bearing a citation, and a sum of money.
- ✓ **Rabindranath Tagore was the first non-European and Indian** to get a Nobel Prize in 1913 in literature.

Source: MicroRNA, gene regulation: What 2024 Nobel Prize for Medicine was awarded for (The Indian Express)

ADITI SCHEME

Context: Union Defence Minister launched Phase 2 of the ADITI Scheme, aiming to improve private participation in India's defence production industry.

About Acing Development of Innovative Technologies with iDEX (ADITI) Scheme:

- It was launched in March 2024 and is aimed at **fostering indigenous innovations in critical and strategic defence technologies.**



- The scheme targets **development of approximately 30 deep-tech critical and strategic technologies** within the proposed timeframe.
- **Start-ups can avail grant-in-aid of up to 50% of project development budget (maximum Rs 25 crore)** for their research, development, and innovation efforts in defence tech.
- ADITI is backed by a budget of **Rs 1150 crore spanning from 2023-24 to 2025-**

26.

- It **operates within iDEX** (Innovations for Defence Excellence) framework under the Ministry of Defence.

Features of the Scheme

- **Bridge-building Initiative:** ADITI aims to establish a ‘Technology Watch Tool’ to bridge the gap between the modern Armed Forces’ expectations and requirements and the capabilities of the defence innovation ecosystem.
- **Incentives for Innovators:** iDEX has been expanded to iDEX Prime, offering increased assistance from Rs 1.5 crore to Rs 10 crore, motivating young innovators to participate.
- **Empower Youth:** Aims to nurture youth innovation, propelling India forward in defence technology.

Innovations for Defence Excellence (iDEX) Initiative

- ✓ iDEX is an initiative to contribute towards modernization of the defence industry. It was launched in April 2018.
- ✓ iDEX aims to promote innovation and technology development in defence and aerospace by engaging industries (including MSMEs, R&D institutes start-ups, academia, and individual innovators).
- ✓ iDEX will provide the industry with funding and other support to carry out Research & Development.
- ✓ iDEX will be funded and managed by Defence Innovation Organization (DIO), and will function as the executive arm of DIO.

Source: Defence Minister Launches ADITI 2.0, Calls To Innovate Distinctive Tech (Deccan Herald)

POCSO ACT, 2012

Context: The POCSO Act, 2012 has recently been in the news in the context of an alleged rape against a minor girl in West Bengal.



About Protection of Children from Sexual Offences (POCSO) Act, 2012:

- It was enacted in consequence to **India’s ratification of the UN Convention on the Rights of the Child** in 1992.
- It aims to address offences of sexual exploitation and sexual abuse of children, which were either not specifically defined

or in adequately penalised.

- The Act **defines a child as any person below the age of 18 years**. The Act provides **punishment as per the gravity of offence**.

- The Act was **amended in 2019 to introduce more stringent punishment including the death penalty** for sexual crimes on children, with a view to deter such crimes against children.
- The Govt of has also notified the **POCSO Rules, 2020**.
- Nodal Agency: **Ministry of Women and Child Development**

Key provisions of POCSO Act:

- **Gender-neutral legislation:** The Act recognizes that both girls and boys can be victims of sexual abuse.
- **Non-reporting is a crime:** Any person in charge of an institution who fails to report commission of a sexual offence faces punishment.
- **No time limit for reporting abuse:** A victim may report an offence at any time, even years after the abuse.
- **Victim's identity is confidential:** It forbids disclosure of victim's identity in any form of media unless authorised by POCSO special courts.
- The **storage of child pornography** has also been made a new offence.
- **Offence of 'sexual assault' has been defined in explicit terms** unlike the abstract definition of 'outraging modesty of a woman' in the Indian Penal Code.

POCSO Rules 2020:

- **Interim Compensation and Special Relief:**
 - It allows the Special Court to order interim compensation for the child's needs related to relief or rehabilitation after FIR registration. This payment is adjusted against the final compensation, if any.
- **Immediate Payment of Special Relief:**
 - The Child Welfare Committee (CWC) may recommend payment for needs like food, clothes, transport, etc. using funds from the District Legal Services Authority (DLSA), the District Child Protection Unit (DCPU), or funds maintained under Juvenile Justice Act 2015.
 - Payment must be made within a week of receiving the CWC's recommendation.
- **Support Person for the Child:**
 - CWC can provide a support person to assist the child throughout the investigation and trial process.
 - This person protects the child's best interests such as physical, emotional, and mental well-being, access to medical care, counselling, & education. They also inform the child and their guardians about developments related to the case.

Scheme to Support Pregnant Minor Victims of Sexual Assault

- It was **notified under Section 4 & 6 of the POCSO Act, 2012**.
- It seeks to **assist minor girls who have been abandoned by their families** due to forced pregnancies resulting from rape or gang rape.
- It acknowledges the physical and emotional trauma on minor victims of rape and aggravated assault.
- The scheme, with an outlay of Rs 74.10 crore, will **offer shelter, food, legal aid, medical care and other necessary assistance to victims under the Nirbhaya Fund**.
- It is **not mandatory for victims to possess a copy of the FIR** to avail the benefits provided by the scheme.
- The funds will be utilized to **set up shelters dedicated to these victims**, either as **standalone shelters or designated wards within existing child care institutions (CCIs)**.

- It will leverage the administrative structure of Mission Vatsalya in collaboration with state govts & CCIs.

Key Data regarding POCSO Act:

- **415 POCSO fast-track courts** have been established across India to expedite justice for minor victims.
- According to National Crime Records Bureau (NCRB) **2021 data, 51,863 cases** were reported under the Act.
- Out of these cases, 64% were reported under Sections 3 and 5 of the Act, which pertain to penetrative sexual assault and aggravated penetrative sexual assault.

Nirbhaya Fund:

- ✓ Established in 2013 and provides for a non-lapsable corpus fund for safety & security of women. It is **administered by Dept. of Economic Affairs (DEA) of the Ministry of Finance.**
- ✓ But **Ministry of Women and Child Development** selects proposals to be funded under the Nirbhaya Fund.

Mission Vatsalya:

- ✓ **Centrally Sponsored Scheme under the Ministry of Women & Child Development** to achieve development and child protection priorities aligned with the SDGs.

Child Care Institutions:

- ✓ **Defined under the Juvenile Justice Act 2015** as a facility fit for providing care and protection to children who are in need of such services.

Child Welfare Committees (CWC):

- ✓ They are **created under the Juvenile Justice Act of 2015.**
- ✓ It is a **quasi-judicial agency** and is the final authority on children in need of care and protection. Anyone who is connected to the child can file a petition to the Magistrate of that District, who heads the CWC.
- ✓ It is **mandatory to form one or more CWCs in every district.**

Source: AIIMS doctors do autopsy on Bengal minor rape victim (The Hindu)

PLACES IN NEWS

Hirakud Dam



- The six-decade-old **canal system of Odisha's Hirakud Dam is undergoing renovation.** This aims to modernise irrigation infra, reduce water wastage, and enhance agricultural productivity.

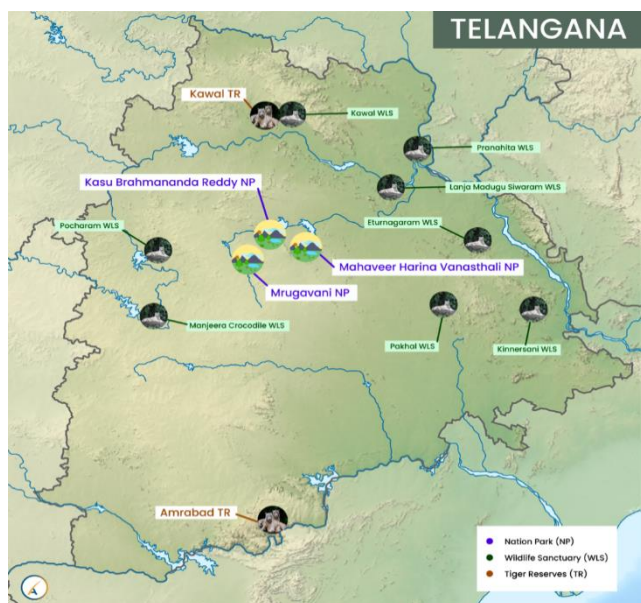
- It is a multipurpose scheme **conceived by Er. M. Visveswaraya in 1937**, after a recurrence of devastating

floods in the Mahanadi River.

- Built around 1952-53, the Hirakud Dam is one of **India's first major multipurpose river valley projects** post-independence.
- It holds the title for the **longest major earthen dam globally**, stretching 25.8 km across the **Mahanadi River.**
- It was inaugurated by the then Prime Minister Jawaharlal Nehru in 1957.

- Hirakud Dam forms **Hirakud Reservoir**, one of the largest artificial lakes in Asia. Hirakud Reservoir was declared a **Ramsar site in 2021**.
- The dam has an installed capacity of 359.8 MW for hydroelectric power, contributing to the region's energy supply. The reservoir irrigates 436,000 hectares of land, benefiting farmers in the region.

Eturnagaram Wildlife Sanctuary



- **Large rains recently flattened over 50,000 trees** in Eturnagaram Wildlife Sanctuary, Telangana, devastating the landscape.

- It is **located in Telangana**, around 100 kilometers east of Warangal.

- The sanctuary is located near the **border of Maharashtra, Chhattisgarh and Telangana**.

- A **perennial water source called Dayyam Vagu** flows through the sanctuary. It separates the wildlife sanctuary into two parts.

- The sanctuary is also famous for

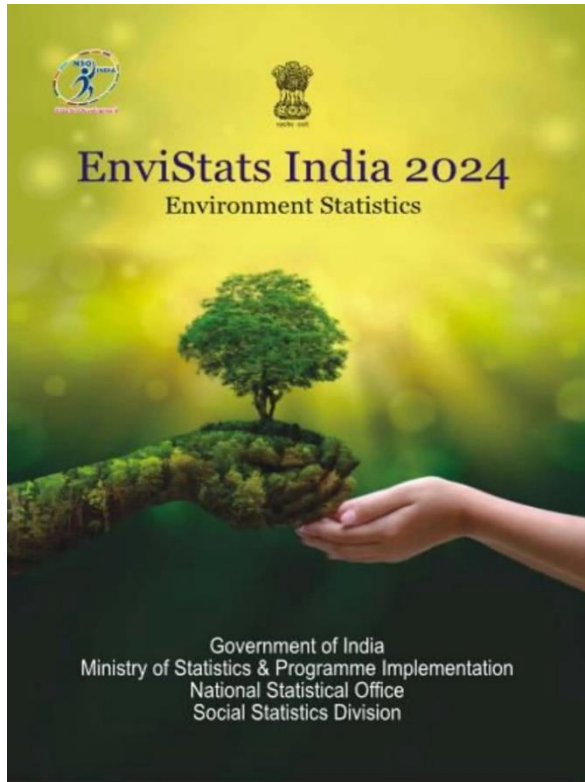
the **Sammakkka Sarakka Jathra**, one of **Asia's largest tribal festivals**, which takes place here every two years.

- The **Godavari** also passes through the sanctuary.
- The region falls in the **tropical dry deciduous** type of vegetation.

TERMS IN NEWS

EnviStats India 2024

- Ministry of Statistics and Programme Implementation (MoSPI) has released the **“EnviStats India 2024: Environment Accounts” Report**.
- It compiles **environmental-economic accounts** based on the **System of Environmental-Economic Accounting (SEEA) Framework**.
 - SEEA is a UN-supervised method to compile data linking environmental statistics to economic statistics.



- This helps **integrate environmental data with economic statistics**, offering insights into the country's natural resources, ecosystems, and environmental sustainability efforts.

- There has been a **72% increase in the number of Protected Areas (2000-2023)**, whilst there has been a **16% increase in the area of Protected Areas** in the same time period.

The report highlighted an **8% increase in mangrove cover (2013-2021)**, highlighting positive growth in coastal ecosystem protection.

PRACTICE QUESTIONS

Q1. This protected area is located near the tri-junction region of Maharashtra, Chhattisgarh, and Telangana. The Godavari passes through this protected area. It is primarily inhabited by the Koya tribes. It is perhaps most famous for hosting the Sammakka Saralamma Jatara, one of the largest tribal festivals in the world.

Identify the protected area described in the afore mentioned paragraph.

- Nagarjunasagar Srisaillam Tiger Reserve
- Papikonda National Park
- Pench Tiger Reserve
- Eturnagaram Wildlife Sanctuary

Q2. Consider the following statements regarding MicroRNA (miRNA), the discovery of which was recently awarded the Nobel Prize for Medicine:

1. They are smaller than messenger RNA (mRNA), and consist of a smaller number of nucleotides.
2. miRNA plays a key role in cellular processes such as growth and protein synthesis.
3. Unlike RNA which has a single helix structure, miRNA has a double helix structure.

Which of the afore mentioned statements are correct ?

- 1 and 3
- 2 and 3
- 1 and 2
- 1, 2 and 3

Q3. Consider the following major dams in India and the rivers that they are constructed on:

1. Pong Dam: Beas
2. Hirakud Dam: Mahanadi
3. Almatti Dam: Godavari
4. Bhakra Nangal: Indus

How many of the afore mentioned pairs are correctly matched ?

- A. Only one pair
- B. Only two pairs
- C. Only three pairs
- D. All four pairs

How many of the afore mentioned statements are correct ?

- A. None of the statements
- B. Only one statement
- C. Only two statements
- D. All three statements

Q4. The “ADITI Scheme”, recently seen in the news, is related to which of the following objectives ?

- A. Improving indigenous R&D in defence technology
- B. Increasing the use of rooftop residential solar power
- C. Promotion of traditional Indian handicrafts and artisans
- D. Providing financial support to women entrepreneurs

Q5. Consider the following statements regarding the Protection of Children from Sexual Offences Act (POCSO), 2012:

1. It defines a child as someone between the ages of 6 and 14.
2. There is a limitation period of 10 years within which a case must be filed by the victim.
3. Child Welfare Committees (CWCs) have been created under the Act for its proper implementation.

Answers:

1. D
2. C
3. B
4. A
5. A