Prelim Bits 13-10-2021 (Nobel Prize Special) | UPSC Daily Current Affairs

History of Nobel Prize

- The Nobel Prize was set up when businessman Alfred Nobel died and left the majority of his fortune to the establishment of prizes in physics, chemistry, physiology or medicine, literature and peace.

- His will stated that the prizes should be awarded to those who shall have conferred the greatest benefit to humankind.

- Since the 1st Nobel Prizes were awarded in 1901, they have been awarded annually. It was not awarded, mostly during World War I and II.

- A Nobel Prize cannot be awarded posthumously.

Nobel Prize	Selection
Nobel Prize in Physics and Chemistry	Royal Swedish Academy of Sciences
Nobel Prize in Physiology or Medicine	The Nobel Assembly at Karolinska Institutet
Nobel Prize in Literature	The Swedish Academy
Nobel Peace Prize	Norwegian Nobel Committee

- [Norwegian Nobel Committee is a 5-member committee of the Norwegian Parliament (Storting).]
- **Fund** - When Alfred Nobel died leaving the majority of his fortune to the establishment of the Nobel Prize he stated that the money should be converted into a fund and invested in "safe securities."
- Today the interest earned on that money is used to fund the Nobel Prizes.

Nobel Prize Laureate

- The word "laureate" refers to being signified by the laurel wreath.
- In ancient Greece, laurel wreaths were awarded to victors as a sign of honour.

Nobel Prize in Physics 2021

The Nobel Prize in Physics 2021 was awarded with one half jointly to Syukuro Manabe, Klaus Hasselmann and the other half to Giorgio Parisi for groundbreaking contributions to our understanding of complex systems.

- They have laid the foundation of our knowledge of the Earth's climate and how humanity

influences it.
- They have revolutionized the theory of disordered materials and random processes.

Complex Systems

- Complex systems are systems composed of many components which may interact with each other.
- They are characterised by **randomness and disorder** and are difficult to understand.
- Examples are Earth's global climate, organisms, the human brain, etc.,
- One complex system of vital importance is **Earth's climate**.

Nobel Prize in Chemistry 2021

The Nobel Prize in Chemistry 2021 was awarded jointly to Benjamin List and David W.C. MacMillan for the development of Asymmetric Organocatalysis.

- Organocatalysis is a precise new tool for **molecular construction**.
- In Organocatalysis, organic catalysts are used to drive multitudes of the chemical reactions.
- The rapid expansion in the use of organic catalysts is primarily due to their ability to drive *asymmetric catalysis*.
- In asymmetric catalysis, two different molecules are built, in which each molecule is a mirror image of the other one.
- Using Organocatalysis, researchers can now more efficiently construct anything from new pharmaceuticals to molecules that can capture light in solar cells.

Catalysts

- Catalyst is any substance that increases the rate of a reaction without itself being consumed.
- Enzymes are naturally occurring catalysts responsible for many essential biochemical reactions.
- Catalysts are categorized into,
    1. **Homogeneous catalyst** - Reaction mixture and catalyst both are present in the same phase. (e.g.): Brønsted and Lewis acids, transition metals, organometallic complexes, organocatalyst.
    2. **Heterogeneous catalyst** - Catalysts exist in a different phase than the reaction mixture.
    3. **Biocatalysts** - Natural proteins (enzymes) or nucleic acids (RNA or DNA or ribozymes) used to catalyze specific chemical reactions outside the living cells is called biocatalysis.

Organic catalysts

- Organic catalysts have a stable **framework of carbon atoms**, to which more active chemical groups can attach.
- These often contain common elements such as oxygen, nitrogen, sulphur or phosphorus. This means that these catalysts are both environmentally friendly and cheap to produce.

Catalysis - Examples

- **Homogeneous catalysis** - Carbonylation, oxidation, hydrocyanation, metathesis, and hydrogenation.
- **Heterogeneous catalysis** - Haber-Bosch process for the synthesis of ammonia, Fischer–Tropsch process to produce hydrocarbons.

Nobel Prize in Physiology or Medicine 2021

The Nobel Prize in Physiology or Medicine 2021 was awarded jointly to David Julius and Ardem Patapoutian for their discoveries of receptors for temperature and touch.

- The work of the scientists is focused on the field of somatosensation.

    - Somatosensation is the ability of specialised organs such as eyes, ears and skin to see, hear and feel.
    - The impressions of temperature, touch and movement are feelings relying on somatosensation.
    - Somatosensation information continuously flows from the skin and other deep tissues.
    - It is also essential for tasks that we perform effortlessly and without much thought.

- **Temperature - Capsaicin** from chili peppers was used to identify TRPV1, an ion channel activated by painful heat.
- **Menthol** was used to identify TRPM8, a receptor that was shown to be activated by cold.
- Additional ion channels related to TRPV1 and TRPM8 were identified and found to be activated by a range of different temperatures.
- These ion channels help us understand how different temperatures can induce electrical signals in the nervous system.

- **Touch - Cultured mechanosensitive cells** were used to identify **Piezo1,** an ion channel activated by mechanical force.
- Based on its similarity to Piezo1, a second ion channel Piezo2 was found.
- Piezo1 & Piezo2 have been shown to regulate additional important physiological processes including blood pressure, respiration and urinary bladder control.

Receptor	Receptor Type	Inducer
TRPV1	Heat-sensing receptors	Capsaicin
TRPV8		Menthol
Piezo1 & Piezo2	Mechanosensitive receptors	Cultured mechano-sensitive cells

Nobel Prize in Literature 2021

The Nobel Prize in Literature 2021 was awarded to Abdulrazak Gurnah, who was born in Zanzibar.

- It was awarded for his uncompromising and compassionate penetration of the effects of colonialism and the fate of the refugee in the gulf between cultures and continents.
- Born in Zanzibar**,** Gurnah was forced to flee to the United Kindom at the end of the 1960s after a revolution occurred in Zanzibar.

Zanzibar

- Zanzibar Island, also known as Unguja, is the main island in the Tanzanian archipelago of Zanzibar.
- In 1964, Zanzibar, Pemba Island and some other smaller islands, joined with Tanganyika on the mainland to form the United Republic of Tanzania.



Nobel Peace Prize 2021

The Nobel Peace Prize 2021 was awarded jointly to Maria Ressa and Dmitry Andreyevich Muratov for their efforts to safeguard freedom of expression, which is a precondition for democracy and lasting peace.

- Maria Ressa uses freedom of expression to expose abuse of power, use of violence and growing authoritarianism in her country, the **Philippines**.
- In 2012, she co-founded Rappler, a digital media company for investigative journalism, which she still heads.
- Dmitry Andreyevich Muratov has for decades defended freedom of speech in **Russia** under increasingly challenging conditions.
- In 1993, he was one of the founders of the Novaja Gazeta - the most independent newspaper in Russia - that has a fundamentally critical attitude towards power.

Country	**Rank in World Press Freedom Index 2021**
Norway	1
Philippines	138
Russia	150
India	142

Sveriges Riksbank Prize in Economic Sciences 2021

The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 2021 was awarded to three people.

- The one half of the award was given to **David Card** for his empirical contributions to labour economics.
    - Using natural experiments, David Card has analysed the labour market effects of minimum wages, immigration and education.
    - The results showed that increasing the minimum wage do not necessarily lead to fewer jobs, among other things.
    - So, we now know that the incomes of people who were born in a country can benefit from new immigration, while people who immigrated at an earlier time risk being negatively affected.
    - It also showed that resources in schools are far more important for students' future labour market success than was previously thought.
- The other half of the award was jointly given to **Joshua D. Angrist** and **Guido W. Imbens** for their methodological contributions to the analysis of causal relationships.
    - They demonstrated how precise conclusions about cause and effect can be drawn from natural experiments.

Sveriges Riksbank Prize in Economic Sciences

- In 1968, Sveriges Riksbank (Sweden's central bank) established the Prize in Economic Sciences in Memory of Alfred Nobel.
- The Prize is based on a donation received by the Nobel Foundation in 1968 from Sveriges Riksbank.
- The first Prize in Economic Sciences was awarded to Ragnar Frisch and Jan Tinbergen in 1969.
- The Prize in Economic Sciences is awarded by the Royal Swedish Academy of Sciences, Stockholm, Sweden, according to the same principles as for the Nobel Prizes that have been awarded since 1901.

Source: Nobel Prize, The Hindu, The Indian Express

