

# 14 Feb 2021: UPSC Exam Comprehensive News Analysis

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*Nothing here for today!!!*

## B. GS 2 Related

### Category: INTERNATIONAL RELATIONS

#### 1. The heights of constant friction

##### Context:

- **Disengagement of Indian and Chinese troops** on the north and south banks of **Pangong Tso**.

For more information on this development refer to:

[12th Feb Comprehensive News Analysis](#)

##### Details:

- As per the agreement, both sides will cease their forward deployments in a “phased, coordinated and verified manner” and will move back to their permanent bases. The process would be jointly monitored.
- Any structures that had been built by both sides since April 2020 in both north and south bank area will be removed and the landforms will be restored.
- Both sides have also been agreed to a “temporary moratorium” on military activities on the north bank, including patrolling to the traditional areas, which will be resumed only when an agreement is reached in diplomatic and military talks between the two countries.

##### Significance:

- The disengagement may help **end the nine-month-long stand-off in eastern Ladakh**. With Pangong emerging as the focal point of the stand-off, the disengagement in the Pangong Tso area is expected to be the first step in addressing outstanding problems at **Hot Springs, Gogra and Depsang**.
- For India, Pangong positions are critical to maintaining a hold on **Chushul Valley**. The Chushul sector is critical as it lends room for tank manoeuvres owing to its flat terrain. Over the years, India has strengthened its defences on the south bank through deployment of tanks.

## C. GS 3 Related

### Category: SCIENCE AND TECHNOLOGY

#### 1. Nanophotonics: Hyderabad scientists manipulate tiny crystals

##### Context:

- Development of the “**mechanophotonics**” technique by researchers of University of Hyderabad.

##### Background:

Nanophotonics:

- **Nanophotonics or nano-optics** is the study of the behaviour of light on the nanometer scale, and of the interaction of nanometer-scale objects with light.
- Small lasers have various desirable properties for optical communication including low threshold current (which helps power efficiency) and fast modulation (which means more data transmission). Small photodetectors tend to have a variety of desirable properties including **low noise, high speed, and low voltage and power**.
- Nanophotonics has immense potential in fields ranging from biochemistry to electrical engineering. Nanophotonics would make it possible to go beyond current electronics and build up **circuits driven entirely by photons (light)**.

#### Details:

- Researchers from University of Hyderabad have developed a technique named “mechanophotonics” which has allowed them to move, slice, bend, and lift micron-sized waveguiding crystals using **atomic force microscopy**.
  - Crystals are normally rigid, stiff structures.
  - Generally, millimetre- to centimetre-long crystals were bent using hand-held tweezers. This method lacks precision and control. Also, the crystals used were larger than what was required for miniaturisation.
- The researchers have also been able to develop other crucial photonic elements like polymer microcavities or **microresonators** (light-trapping elements) using the same technique.
- The researchers have been able to build an ‘**organic photonic integrated circuit**’ or **OPIC** using the technique.

#### Significance:

- The ability to manipulate micron-sized crystals with precision and control would be very useful in the field of nanophotonics.
- This technique can help achieve an **unprecedented level of miniaturisation and pave the way to all-optical-technology** such as pliable, wearable devices operated by light entirely.

## 2. Plumbing the ‘dark’ genome for new genes

#### Context:

- Study by a team of the University of Cambridge to find the emergence of new genes in the **genome** of living organisms and the mechanisms involved.

#### Background:

##### The Human Genome Project:

- The **Human Genome Project (HGP)** was an international scientific research project with the goal of determining the base pairs that make up human DNA, and of identifying and mapping all of the genes of the human genome from both a physical and a functional standpoint.
- It was an historic landmark for genetic research which **helped map human genes, strengthened the study of human diseases and aided new drug discovery**.

#### Details:

- The research team have **catalogued 1,94,000 novel regions in the human genome**. These novel regions have been referred to as **novel Open Reading Frames** or as **nORFs**.
  - The study has shown that the mutations in nORFs have physiological consequences. The team found that nORFs are broadly involved in diseases like cancer. Some nORF disruptions are also strongly correlated with the survival of patients.
  - The study notes that nORFs proteins can form structures, can undergo biochemical regulation like known proteins and be targeted by drugs.
- The researchers have also identified nORFs in **Plasmodium falciparum**, the parasite which causes the deadliest form of malaria.

#### Significance:

- The study shows that there is an urgent need to **redesign the existing drugs** that target only the known proteins in the parasite and also target the newly discovered nORFs.
- Better understanding of human genome structure including the newly discovered nORFs can **aid diagnosis and cure disease** through new drug discovery.

### 3. Detailed genome map of malaria vector

#### Context:

- Scientists have unveiled the detailed **genome** of the **Asian malaria vector mosquito Anopheles stephensi**.

#### Details:

- Under the newly upgraded Anopheles stephensi genome, more than 3,000 genes that previously undetected genes have been unearthed.
  - The newly discovered genes are found to play key roles in the metabolism of ingested blood meal, reproduction and immunity against microbial parasites.
  - The discoveries also include 29 formerly undetected genes that play crucial roles in resistance to chemical insecticides.

#### Significance:

- The detailed genome of the malaria mosquito vector including new genes vital for the **development of genetic control strategies of disease transmission** would help malaria biologists in India and the rest of the world towards the **goal of malaria elimination**. In order to engineer advanced forms of defence against malaria transmission, including targeted CRISPR and gene drive-based strategies, scientists require intricate knowledge of the genomes of vector mosquitoes.
  - CRISPR technology is a gene-editing tool which allows researchers to easily alter DNA sequences and modify gene function.
- The newly discovered genes can also help **address the issue of growing insecticide-resistant mutations** in Asian and African An. stephensi populations.

### Additional information:

#### National goal of malaria elimination:

- The [National Framework for Malaria Elimination \(NFME\)](#) 2016-2030 outlines India's strategy for **elimination of the disease by 2030**.
- The framework has been developed with a vision to eliminate malaria from the country and contribute to improved health and quality of life and alleviation of poverty.
- It is in line with the [WHO Global Technical Strategy for Malaria 2016–2030 \(GTS\)](#).

#### Important goals:

- Eliminate malaria from all low (Category 1) and moderate (Category 2) endemic states/UTs (26) by 2022
- Reduce incidence of malaria to less than 1 case per 1000 population in all States/UTs and the districts and malaria elimination in 31 states/UTs by 2024
- Interrupt indigenous transmission of malaria in all States/ UTs (Category 3) by 2027
- Prevent re-establishment of local transmission of malaria in areas where it has been eliminated and to maintain malaria-free status of the country by 2030.

## D. GS 4 Related

*Nothing here for today!!!*

## E. Editorials

### Category: DISASTER MANAGEMENT

#### 1. Spotlight on dams after Chamoli disaster

##### Context:

- A **snow avalanche in a glacier** in the Rishi Ganga catchment, **triggered possibly by a landslide** caused a **flash flood** in the Rishi Ganga river, a tributary of the Alaknanda in Chamoli district of Uttarakhand.
- The flash floods washed away a functional small hydroelectric project and destroyed the under-construction 520 MW Tapovan Vishnugad project of the NTPC on the Dhauli Ganga river.

For more information on this incident refer to:

**CNA Dated 08th Feb 2021**

##### Background:

#### Hydroelectricity in India:

- In the 25 MW-plus category, there are projects with a combined capacity of 12,973.50 MW under installation. Of this, **eight projects totalling 2,490 MW are in Uttarakhand**.

- The hydroelectric power qualifies as a **renewable energy source and is cheaper compared to coal and gas plants due to lack of recurring costs.**
- The government has been offering incentives to make hydropower attractive. These include **classification of large hydropower projects as Renewable Energy sources**, creating a separate category for hydropower within **Non-Solar Renewable Purchase Obligation**, **tariff rationalisation to bring down tariff**, and budgetary support for putting up enabling infrastructure such as roads and bridges.

#### Concerns over hydroelectric projects in Uttarakhand:

- The recent incident has turned the spotlight on several ongoing dam-based hydroelectric projects in the State.
- Many experts have termed the development of large dam projects in the region unwise. The concerns being expressed about the slew of hydroelectric projects in Uttarakhand are based on the following grounds.

#### **Geological nature of Uttarakhand:**

- Uttarakhand is geologically unique.
- It being a part of the lesser Himalaya, it has numerous earth faults and hence it remains active in terms of deep movement of rock assemblages. It remains fragile from a geological point of view.
- Along the **Main Central Thrust (MCT), running east-west along the Himalaya, the Indian and Eurasian plates converge.** The northward moving peninsular India presses the lesser Himalaya rock assemblages under the huge pile of the Great Himalayan rocks. As a result of the high geological stresses being induced in the region there is a **weakening of rocks in the area.**
  - In fact, many locations in a 50-km area within the MCT zone have witnessed several earthquakes of varying intensity, including those with magnitudes of over 5.

#### **Induced seismic effects of dams:**

- Despite the claim by dam builders that their structures can withstand even high-intensity earthquakes, most designs fail to incorporate the aspect of induced seismic effects of dams, especially in case of large dams.
- Studies associated with Tehri dam has shown that there are concerns about **induced seismic effects caused by the repeated filling and emptying of the reservoir**, may deform the area around the dam making it vulnerable to earthquakes.

#### **Vulnerable terrain:**

- The region being mountainous with its **steep slopes** remains vulnerable to landslides induced with even low intensity earthquakes.
- Moreover, the geology of mountains in many parts of Uttarakhand is such that the threat of landslides is high. **Rocks here have been weakened by natural processes across time and are vulnerable to intense rainfall.**



- The human interference, in the form of house-building and road construction has only added to its vulnerability. The careless disposal of enormous debris from mining and construction projects has led to blocking of the flow path of rivers.

#### Potential impact of climate change:

- The **IPCC (Intergovernmental Panel on Climate Change) Special Report on the Ocean and Cryosphere** in a Changing Climate found that in the Himalayan ranges, there could be variations in overall water availability due to **melting of the glaciers** and **changes in monsoonal precipitation** caused by changes to long-term climate.
- The increased fluvial erosion aggravated by the erosion of mountain slopes would result in **bringing debris and silt down the river courses, destroying physical structures, reducing dam life**, and causing enormous losses.
- The global warming would increase the **instability of glacial lakes in upper elevations**.
- Floods, avalanches and landslides are all forecast to increase in the region.

#### Impact of dam failure:

- A strong earthquake could have a potentially serious fallout in terms of **damage to life and property in the downstream regions**.

#### Capital intensive projects:

- There are also questions being raised over the financial viability of the hydroelectric projects.
- The hydroelectric projects are “**highly capital-intensive**”. They involve large investments and also the time for installation of large projects is large which further increases the costs of funding such projects.

#### Ecological impact:

- Though hydropower has been reliable where suitable dam capacity exists, in places such as Uttarakhand, the net benefit of big dams is controversial because of the collateral and **unquantified damage in terms of loss of lives, livelihoods and destruction of ecology**.
- Large dam projects involve **large scale deforestation and destruction** and involve massive and permanent alteration of the character and health of the hills.

#### Way forward:

- Experts have advocated **small low-impact dams** of less than 5 megawatts as an alternative.
- Additionally **preventive and protective measures** are also needed to reduce the vulnerability to disasters.

For more related information refer to:

[CNA Dated 12 Feb 2021](#)

## Category: HEALTH

### 1. Probing the origins of the COVID-19 pandemic

### Context:

- World Health Organization team's field visit to China to unearth the origin of the SARS-CoV-2 virus.

### Details:

- According to the WHO, the field visits included the Wuhan Institute of Virology, the Huanan market, and the Wuhan CDC (Center for Disease Control and Prevention) laboratory.
- The WHO team undertook scientific investigations to look at four main scenarios for the origin of the virus.
  - A single individual had got infected with the virus through direct contact with bats and then spread it to others in [Wuhan](#).
  - The virus crossing the species barrier from bats to humans through an intermediary species.
  - The virus originated outside China and spread to Wuhan through imported frozen food
  - The virus leaked from the Wuhan Institute of Virology, which has been studying coronaviruses.

### **Most possible reason:**

- The investigation by the WHO team strongly suggests that **though bats were the reservoirs of the virus, it is unlikely that the virus jumped directly from bats to humans**. The direct spillover of the virus from bats to humans is unlikely as Wuhan is miles away from any natural bat habitat.
- The virus may have **crossed from bats to another animal species and finally to humans**. The team has not been able to find the intermediary host.
  - Previous [coronavirus](#) outbreaks — SARS (severe acute respiratory syndrome) and MERS (Middle East respiratory syndrome) — have occurred through civets and camels, respectively.
- The SARS-CoV-2 virus may have either evolved in the intermediate host itself or it may have gained the ability for human-to-human transmission in humans after jumping from an intermediate host. In the latter case, the virus may have evolved certain characteristics in the intermediate host and then gained other features within a human host.

### **Possibility of human intervention:**

- Based on the analysis of public genome sequence data from SARS-CoV-2 and related viruses, scientists have **not found any evidence that the virus was made in a laboratory or engineered by humans**. There are no signatures of the virus being altered or manipulated in a lab.

### **Possibility of a lab-leak?**

- Though the WHO fact-finding team had initially rejected the possibility of a lab-leak, recently WHO Chief has stated that all hypotheses [including the lab-leak] remain open and require further analysis and studies.

## F. Tidbits

### 1. Virus and climate change



- A recent study notes the mechanism linking climate change and emergence of the SARS-CoV-2 virus pandemic.
- Southern China has become a hotspot of bat-borne coronaviruses. The study found that 40 **new species of bats had moved from their forest habitats to the Yunnan province** in the last century, thus increasing the possibility of interactions between humans and the bats.

## 2. Water on Mars

- Researchers have observed **water vapour in the thin atmosphere of Mars**.
  - The water found on Mars is mostly locked up as ice.
  - The traces of ancient valleys and river channels suggest liquid water once flowed across the Mars surface.
- This new finding offers new clues as to whether Mars could have once hosted life.

## 3. West Bengal to host Sanskriti Mahotsav

- **Rashtriya Sanskriti Mahotsav** is a flagship festival organised by the **Ministry of Culture**.
- The intent of Rashtriya Sanskriti Mahotsav is to showcase the rich cultural heritage of the Country in all its rich and varied dimensions, viz Handicrafts, Cuisine, Painting, Sculpture and Performing Arts- Folk, Tribal, Classical and Contemporary- all in one place.
- It involves the demonstration of folk and tribal art, dance, music, cuisines and culture of one state to other parts of the country to ensure '**Ek Bharat Shreshtha Bharat**' and provide platforms for artists and artisans.
- The 11th edition is to be organised in West Bengal.

# G. Prelims Facts

## 1. Black hole cluster

- **NGC 6397 is a cluster of stars in the Ara constellation**. It hosts a **cluster of small black holes** amidst itself.
- NGC 6397 is among the closest globular clusters to the earth.

## 2. Small difference

- Ongoing research has revealed that the alteration of a **single gene (NOVA1 gene)** may be the reason for **cognitive variation between modern humans and our predecessors – the neanderthals and denisovans**.

## 3. Waiting for visitors

- Veermata Jijabai Bhonsale Udyan, also known as the **Byculla Zoo, is a zoo in Mumbai**.
- The **Humboldt penguin is a South American penguin** living mainly in the Humboldt National Reserve in the North of Chile, although its habitat comprises most of coastal Peru. In South America the Humboldt penguin is found only along the Pacific coast. Humboldt penguins are medium-sized penguins. They nest on islands and rocky coasts.

#### 4. Bait, plant and control

What is NetWire?

- **NetWire, is a malware. It is a remote access trojan, or RAT**, which gives control of the infected system to an attacker through a **command and control server**. The commands emerging from this server is what the infected system will carry out.
- Such malware can log keystrokes and compromise passwords.
- While most anti-virus softwares are equipped to counter the threat of **data exfiltration (stealing data)** posed by malwares, these softwares are found to be largely ineffective in countering infiltration of systems.

## H. UPSC Prelims Practice Questions

Q1. Which of the following are the potential advantages offered by Nanophotonics?

1. Faster processing speeds
2. Higher degree of miniaturisation of Integrated circuits
3. Higher power efficiency

Options:

- a. 1 only
- b. 1 and 2 only
- c. 1,2 and 3
- d. 2 only

Answer: c

Explanation:

- Nanophotonics or nano-optics is the study of the behaviour of light on the nanometer scale, and of the interaction of nanometer-scale objects with light.
- Small lasers have various desirable properties for optical communication including low threshold current (which helps power efficiency) and fast modulation (which means more data transmission). Small photodetectors tend to have a variety of desirable properties including low noise, high speed, and low voltage and power.
- Nanophotonics has immense potential in fields ranging from biochemistry to electrical engineering. Nanophotonics would make it possible to go beyond current electronics and build up circuits driven entirely by photons (light).
- With the right technology it would help achieve an unprecedented level of miniaturisation.

Q2. What are the benefits that could accrue due to the Human Genome Project?

1. Understand vulnerability to certain diseases

2. Diagnosis of diseases
3. Application in forensic applied sciences
4. Development of new drugs
5. Better understanding of human evolution

**Options:**

- a. 1,2 and 4 only
- b. 1,2,3,4 and 5
- c. 2,3 and 5 only
- d. 1,4 and 5 only

**Answer: b**

**Explanation:**

- The sequencing of the human genome holds benefits for many fields, from molecular medicine to human evolution.
- The Human Genome Project, through its sequencing of the DNA, can help us understand diseases including: genotyping of specific viruses to direct appropriate treatment; identification of mutations linked to different forms of cancer; the design of medication and more accurate prediction of their effects; advancement in forensic applied sciences; bioarcheology, anthropology and evolution.
- Another proposed benefit is the commercial development of genomics research related to DNA based products, a multibillion-dollar industry.

**Q3. Which of the following statement/s is/are correct?**

1. Malaria is caused by *Plasmodium* parasites.
2. Malaria parasites are spread to people mostly through the bites of infected female Anopheles mosquitoes.

**Options:**

- a. 1 only
- b. 2 only
- c. Both 1 and 2
- d. Neither 1 nor 2

**Answer: c**

**Explanation:**

- Malaria is caused by Plasmodium parasites. There are 5 parasite species that cause malaria in humans, and 2 of these species – *P. falciparum* and *P. vivax* – pose the greatest threat.

- The parasites are spread to people through the bites of infected female *Anopheles* mosquitoes, called “malaria vectors.” In most cases, malaria is transmitted through the bites of female *Anopheles*. There are more than 400 different species of *Anopheles* mosquito; around 30 are malaria vectors of major importance. All of the important vector species bite between dusk and dawn.

**Q4. Which of the following statement/s is/are correct?**

1. Humboldt penguin is endemic to South America.
2. In South America the Humboldt penguin is found only along the Pacific coast.

**Options:**

- a. 1 only
- b. 2 only
- c. Both 1 and 2

**Answer: c**

**Explanation:**

- The Humboldt penguin is a South American penguin living mainly in the Humboldt National Reserve in the North of Chile, although its habitat comprises most of coastal Peru.
- In South America the Humboldt penguin is found only along the Pacific coast. Humboldt penguins are medium-sized penguins. They nest on islands and rocky coasts.
- The Humboldt penguin is a top predator endemic to the west coast of South America.
- The Humboldt penguin’s breeding distribution ranges from southern Chile along the dry and arid coastal regions of the Atacama Desert to subtropical Isla Foca in north Peru. Its range is restricted to the coast and offshore islands affected by the Humboldt current, which provides a continuous supply of nutrients and food, thus supporting huge populations of seabird.

## I. UPSC Mains Practice Questions

1. The recent Uttarakhand flash floods call into question the feasibility of large hydroelectric power projects in the state of Uttarakhand. Comment. Also suggest suitable measures in this direction. (15 marks, 250 words)[GS-3, Disaster Management]
2. Analyze the potential of biotechnology in addressing the challenges that humanity faces in the domain of health and wellbeing. (10 marks, 150 words)[GS-3, Science and Technology]