

## UPSC Daily Current Affairs | Prelim Bits 05-12-2024

### International Centre for Integrated Mountain Development (ICIMOD)

ICIMOD recently launches air quality dashboard to track and forecast pollution across Indo-Gangetic plain.

- ICIMOD is an **intergovernmental organization** that works to improve the lives of people in the Hindu Kush Himalaya (HKH) region and protect the resources and culture that define it.
- **Founded in** - 1983.
- **Location** - ICIMOD is based in Kathmandu, Nepal.
- **Associated countries** - 8 regional countries associated with ICIMOD because Hindu Kush Himalaya mountain range spans those countries.



AFGHANISTAN



BANGLADESH



BHUTAN



CHINA



INDIA



MYANMAR



NEPAL



PAKISTAN

- **Working**
  - Promoting the development of a sustainable mountain ecosystem
  - Improving the living standards of people in the mountains
  - Conserving and managing the region's biodiversity
  - Preparing for disasters and monitoring the environment
- **Funding** - ICIMOD's activities are supported by
  - The governments of Austria, Denmark, Germany, Netherlands, Norway, and Switzerland
  - Regional member countries
  - Over thirty project co-financing donors
- **India's role in ICIMOD** - India is a founding member country of ICIMOD. The Ministry of Environment, Forests and Climate Change (MoEF&CC) is the nodal Ministry in India.

### Hindu Kush Himalaya mountain range

- The HKH region extends 3,500 km over all or part of 8 countries from Afghanistan in the west to Myanmar in the east.
- It is the source of 10 large Asian river systems

Amu Darya	Salween (Nu)
Indus	Mekong (Lancang)
Ganges	Yangtse (Jinsha)
Brahmaputra (Yarlungtsanpo)	Yellow River (Huanghe)
Irrawaddy	Tarim (Dayan)

- It provides water, ecosystem services, and the basis for livelihoods to a population of around

240 million people in the region.

- The basins of these rivers provide water to ***1.9 billion people, a 4<sup>th</sup> of the world's population.***
- A considerable volume of water resources is stored as snow and glacier ice in the HKH.
- Cryosphere components including permafrost and glacial lakes provide various ecosystem services for mountain and downstream communities.

## References

1. [Down to Earth | ICIMOD](#)
2. [ICIMOD | About US](#)

## extrachromosomal DNA (ecDNA)

*A research team called eDyNAMiC recently revealed a study showing how ecDNA is formed and contributes to cancer and drug resistance progression.*

- **ecDNA** - In normal human cells, the nucleus contains **23 pairs** of chromosomes that enclose the DNA.
- There are some natural processes that can damage DNA. For example, in ***chromothripsis***, which occurs in some cancers, the chromosomes are broken and rearranged.
- Cells can also make mistakes in the DNA when making copies of it to imbue in new cells.
- Such processes could cause a small part of the DNA to break away from the main chromosome and form a circular structure that floats freely inside the nucleus. This is ecDNA.
- A study published in 2017 revealed ecDNA is present in nearly 40% of cancer cell lines and in up to 90% of patient-derived brain tumour samples, revealing its pivotal role in cancer biology.
- **Recent Findings** - The team analysed the mutation patterns in tumours before and after the formation of ecDNA.
- They identified various environmental factors, including smoking, exposure to certain substances, and genetic mutations, to be triggers of DNA damage that could lead to the formation of ecDNA.
- They validated their findings using a method called ***fluorescence in-situ hybridisation (or FISH)***, which specifically looks for certain cancer-related genes in tissue samples.
- They found that ecDNA was present in about 17% of tumour samples but more so in liposarcomas, brain tumours, and breast cancers.
- They also reported that the prevalence of ecDNA rose after treatments like chemotherapy, and correlated with metastasis and worse patient outcomes.
- **The association of ecDNA with cancer growth** - ecDNA present in tumours often contain multiple copies of oncogenes, mutated genes capable of causing cancer, required to activate tumour growth.
- But these oncogenes are not present in chromosomes.
- While chromosomal DNA is fixed within specific regions in the cell, ecDNA moves freely and can interact with other ecDNA to form hubs, concentrated zones where oncogenes are expressed more.
- Cells transcribe DNA to mRNA to use the latter to manufacture proteins.
- It has been found that when cells transcribe ecDNA to mRNA, the process causes specific oncogenes to become four-times more common in the cell than if the DNA came from the chromosomes.
- This anomaly has the potential to accelerate the evolution of tumours and help the cancer

resist drugs.

- **Violation of Mendel's third law** - Typically, when cells divide, they duplicate the chromosomes and distribute it equally among their daughter cells.
- In this process the genes on the same chromosome are inherited together while those on different chromosomes are distributed independently of one another.
- This basic genetic principle is called Mendel's third law of independent assortment (named after Gregor Mendel).
- However, ecDNA is passed on in clusters to the daughter cells during cell division is a violation of the third law.
- This clustering gives some cancer cells an advantage because it allows them to enhance gene interactions, support cancer growth, and preserve favorable genetic combinations over multiple life-cycles.

## Reference

[The Hindu | ecDNA challenges law of genetics](#)

## Hitler Beetle (*Anophthalmus hitleri*)

*Many researchers suggested the species *Anophthalmus hitleri* be renamed, the International Code of Zoological Nomenclature's principle of priority holds that the first name validly published for a species is its correct name.*

- It is a species of small brown ***blind cave beetle*** found only in about 15 humid caves in ***Slovenia***.
- **Genus - *Anophthalmus***, shares its genus with 41 other species and 95 different subspecies.
- **Nomenclature** - The species was named by amateur Austrian entomologist Oskar Scheibel as a tribute to Adolf Hitler.
- **Appearance** - The species exhibits no notable characteristics, such as extravagant colors or unusual antennae.
- **Diet** - larvae of *A. hitleri* are presumed to be predators on smaller cave inhabitants.
- **Status** - Though the IUCN has not yet evaluated the species, it is critically endangered due to its declining population.



## The issue behind naming of the species

- Taxonomy is a carefully structured process governed by strict international rules such as the International Code of Nomenclature for algae, fungi and plants.
- Based on these rules, each species receives a unique scientific name, often derived from Latin or Greek.
- One of the most important features of taxonomy is binomial nomenclature.
- This two-part naming system was introduced by the renowned Swedish taxonomist Carl Linnaeus in the 18<sup>th</sup> century.
- When scientists discover a new species, they are responsible for naming it, following the international naming conventions.
- These names frequently reflect the species' physical characteristics, habitat or behaviour.
- Others are inspired by cultural or historical events. They may honour a person, place, or even a mythological figure.
- It makes taxonomy not just a technical field but also a fascinating narrative about the natural world.
- Some species have recently been named after politicians and musical celebrities.

Species	Named after
<b>Scaptia beyonceae</b>	A horsefly named for singer Beyoncé Knowles
<b>Singafrotypa mandela</b>	A spider, named for global statesman Nelson Mandela
<b>Neopalpa donaldtrumpi</b>	A moth, named for incoming US president Donald Trump
<b>Anophthalmus hitleri</b>	A beetle species was named as a tribute to Adolf Hitler
<b>Hottentotta jayakari jayakari</b>	A species of scorpion was named to denigrate the Khoekhoe people of south-western Africa, mocking their language by Europeans.

- There is a growing call by scientists to revise species names that are offensive, outdated, or linked to colonialism, social injustice or prejudice.
- Potential method to address problematic eponyms, species named for individuals is to take a symbolic approach, replacing them with neutral placeholders.
- The enduring legacy of racist, offensive terms in scientific nomenclature raises important questions about ethics and the power of language in maintaining or dismantling colonial legacies.

## References

1. [The Hindu | Hitler Beetle](#)
2. [Animalia | Anophthalmus hitleri](#)

## Toxins of the Bhopal disaster

*Hundreds of tonnes of toxic waste have yet to be removed from the premises of Union Carbide even after 40 years of the Bhopal disaster.*

- Bhopal plant is built in late 1960s to manufacture an insecticide called **carbaryl** using a reaction of methyl isocyanate (MIC) with 1-naphthol.

- **Methyl Isocyanate (MIC)** - MIC (C<sub>2</sub>H<sub>3</sub>NO) is a highly toxic compound, volatile colorless liquid that used in the manufacture of pesticides such as carbofuran, carbaryl, and aldicarb.
- It is extremely flammable, and potentially explosive when mixed with air.
- It reacts with water at high temperatures and its reaction with water also releases heat.
- **Effect on Humans**
  - It doesn't have a particular smell at concentrations at which other gases may become noticeable.
  - It is irritating to the eyes, respiratory tract, and skin.
  - High vapor concentrations cause severe pulmonary edema and injury to the alveolar walls of the lung, severe corneal damage, and death.
- It is responsible for the gas leaked from a pesticide plant.
- Union Carbide Corporation has never officially specified which gases were leaked from the plant, including MIC.
- Greenpeace released a report in 1999, which reported the presence of,

Heavy Metals	Organic Compounds
Mercury	Hexachlorobutadiene
Chromium	Chloroform
Copper	Carbon tetrachloride
Nickel	Trichlorobenzene
Lead	Persistent Organic Pollutants (POPs)

### Toxics of Heavy Metals

- Heavy metals' density is at least **5 times that of water**.
- **Mercury** - It damages multiple organs even at low concentrations by accumulating in soft tissue and preventing normal cellular function.
- **Chromium** - The high doses cause various cytotoxic and genotoxic reactions that affect the immune system and also cause cancers in the lungs.
- **Copper** - It damages the liver, the kidneys, and the gastrointestinal system at high concentration.
- **Nickel** - Its high exposure effects lung fibrosis, kidney and cardiovascular diseases and cancer in the respiratory tract.
- **Lead** - It damaging chlorophyll and disrupting photosynthesis in the plants and rendering structural damage to cells.
- Lead from inorganic compounds correlated with cancers on the stomach, lungs, kidneys, and brain.

### Harmful organic compounds

- **Hexachlorobutadiene** - It is a carcinogen and corrosive in humans which destroy cells in the kidneys involved in producing urine, and inhibit brain activity.
- **Chloroform** - It is also a carcinogen and at a sufficient concentration, it caused an adult to faint, and at higher concentrations cause death.
- **Carbon Tetrachloride** - It damages the liver, nerves, and causing blur vision, cancer, heartbeat irregularity.
- **Trichlorobenzene** - It is a volatile and spread easily through the air, and also found in groundwater and surface water bodies like lakes.
- These build up in the body's fatty tissues and at high concentrations damage the liver and kidneys.
- **Persistent Organic Pollutants (POPs)** - It doesn't break down easily and last for many

years in the environment.

- Its effects include cancer, allergies and hypersensitivity, damage to the central and peripheral nervous systems, reproductive disorders, and disruption of the immune system.

## Reference

[The Hindu | Toxins of the Bhopal disaster](#)

## World AIDS Day

*According to the Tamil Nadu State AIDS Control Society (TANSACS), the State had declined in the HIV prevalence from 1.18% in 1997 to 0.16% during 2023-2024.*

- **HIV** - Human Immunodeficiency Virus (HIV) is a retrovirus that targets the body's white blood cells, and weakens the immune system.
- **AIDS** - Acquired Immunodeficiency Syndrome (AIDS) is occurred at the late stage of HIV Infection.
- It occurs when the body's immune system is badly damaged because of the virus.
- **Transmission of HIV & AIDS** - It is transmitted by the exchange of body fluids from people, including blood, breast milk, semen, and vaginal secretions.
  - It is not spread by kissing, hugging, shaking hands, or sharing personal objects, food or water.
- **Treatment of HIV & AIDS** - There is no cure for this infection.
- **Prevention of HIV & AIDS** - It is a preventable disease which is treated with antiretroviral drugs.
- Current antiretroviral therapy (ART) does not cure HIV infection but allows a person's immune system to get stronger.
- **World AIDS Day** - It has observed every year on **1<sup>st</sup> December** since 1988 after a recommendation by the World Health Organization (WHO) and the United Nations (UN).
- It serves as a global movement to unite people in raising awareness about HIV and AIDS.
- The **first known cases of aids** were reported in 1981.
- It is an opportunity for every community and individual to honor the more than 32 million people who have died worldwide from AIDS-related illness.
- **World AIDS Day, 2024 - Theme** - Take the Rights Path, My Health, My Right.
- It seeks to foster inclusivity, reduce stigma, and encourage global cooperation to eradicate AIDS as a public health threat.
- **Global response** - The Joint United Nations Programme on HIV/AIDS (UNAIDS) is leading the global effort to end AIDS as a public health threat **by 2030** as part of Sustainable Development Goals.
- **India's Response** - **National AIDS and STD Control Programme (NACP)** launched on 1992 for prevention and control of HIV/ AIDS.
- Over 35 years, it has become one of the largest HIV/AIDS control programs in the world.
- HIV Estimation in 2012, has demonstrated an overall reduction of 57% through this programme.
- The adult HIV prevalence has decreased from 0.41% in 2001 to 0.27% in 2011.
- **Wider access to Anti-Retroviral Therapy (ART)** has resulted in 29% reduction in estimated annual deaths due to AIDS.
- It is committed to achieving **Millennium Development Goals (MDG)** in reducing HIV mortality.

- Efforts are being made to reduce the number of HIV cases to zero and there is a long way to go for an "AIDS Free India".

## References

1. [The Hindu| World AIDS Day 2024](#)
2. [PIB| World AIDS Day 2024](#)
3. [UNAIDS| World AIDS Day 2024](#)

