

Ballistic Missile Defence

❖ Context

- India successfully demonstrated its **naval ballistic missile defence (BMD)** capabilities by carrying out the maiden flight trial of a sea-based **endo-atmospheric interceptor missile** off the coast of Odisha.



❖ Key Highlights:

- The trial aimed to **intercept and neutralize** a hostile ballistic missile threat, thus elevating India to the elite club of nations with naval BMD capability.
- India has already demonstrated its land-based BMD systems, but this successful test of the sea-based BMD system is a significant milestone in India's efforts to achieve **self-reliance in developing** complex network-centric anti-ballistic missile systems.
- The Defence Research and Development Organisation (DRDO) and Indian Navy, along with industry partners, were involved in the successful demonstration of the **ship-based BMD capabilities**.
- India has made significant advances in developing endo-atmospheric and exo-atmospheric intercept systems to destroy incoming hostile missiles **within and outside the atmospheric limits, respectively**.
- The two systems have been integrated for a multi-layered defence against ballistic missiles.
- India is pursuing its BMD programme in two phases, with the first phase completed and the second underway.
- The second phase is for validating intercept systems in a new range category.

- In November 2022, DRDO successfully tested a long-range interceptor missile, called **AD-1**, designed for both exo-atmospheric and endo-atmospheric interception of ballistic missiles.

BALLISTIC MISSILE DEFENCE

- Aim is to provide an effective **missile shield** against incoming enemy nuclear missiles
- A hostile missile needs to be intercepted at **boost** (launch) point, **mid-course** (flight through space), or **terminal** phase (during atmospheric descent)

BMD systems usually consist of:

- Overlapping network of early-warning & tracking radars
- Reliable command and control posts
- Land- & sea-based batteries of advanced interceptor missiles

Only handful of countries like **US, Russia, China & Israel** have effective BMD systems

But no system is **100% full-proof**



THE INDIAN STORY

- Development of two-tier BMD system began in **late-1990s**
- An interceptor missile was **first tested in 2006**
- Since then, interceptor missiles tested around 10 times. At least **3 tests have failed**
- BMD system designed to track & destroy hostile missiles both inside (**endo**) & outside (**exo**) the earth's atmosphere
- But not yet tested in integrated mode, with both exo and endo interceptor missiles together
- **Phase-I** of BMD system geared towards tackling enemy missiles with a **2,000-km** range. **Phase-II** to enable interception of missiles in **5,000-km** range
- But long delay in becoming operational. DRDO had earlier promised the two-tier missile shield would be deployed in Delhi by 2014

Myelin Sheath

❖ Context

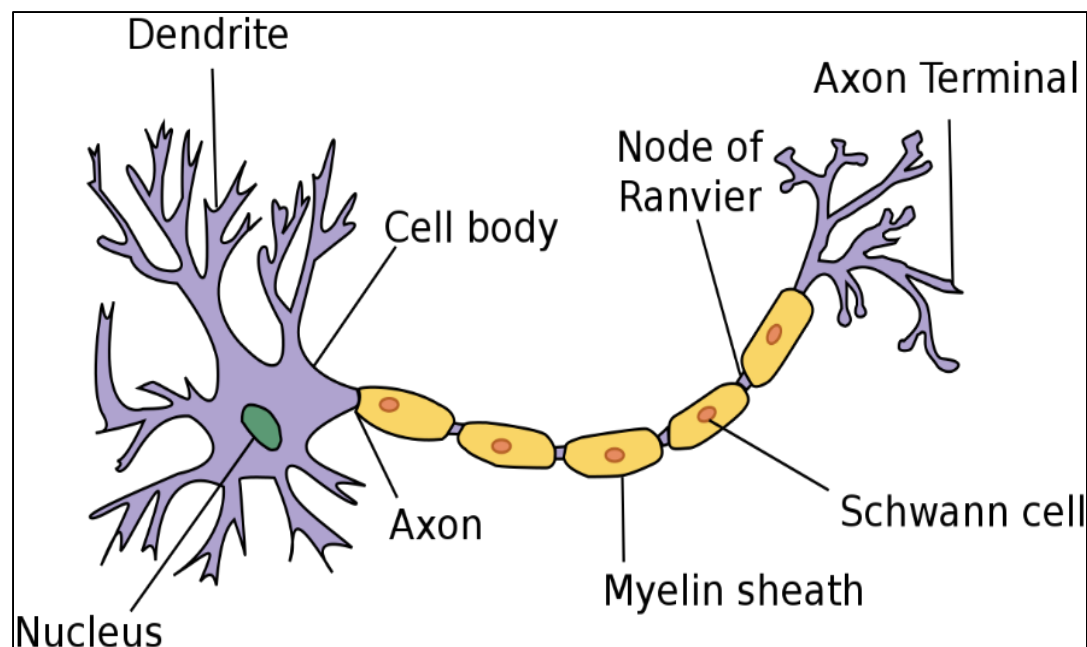
- Scientists from the **Institute of Advanced Studies in Science and Technology**, Guwahati, have successfully fabricated monolayers of pure **myelin basic protein (MBP)** using the **Langmuir-Blodgett (LB)** technique.

❖ Key Highlights:

- Researchers have utilized the **Langmuir-Blodgett (LB)** technique to form monolayers of pure MBP protein to study the role of **MBP in myelin sheath formation and stability**.
- MBP is a major protein component of myelin sheath, which is a protective membrane that wraps around the axon of nerve cells and is a model protein for studying diseases like **multiple sclerosis (MS)**.
- The monolayers formed by the LB technique provide an in-depth understanding of the role of **MBP in forming multi-lamellar myelin sheath** structure and preserving its **integrity, stability, and compactness**.
- The research group also investigated the behaviour of the protein under variable **pH conditions** and tracked the stability and **rigidity of the protein films**.
- The reversible nature of the molecules confirmed the flexibility of the films with respect to the **pH conditions**.
- The rigidity of the **monolayers** was **correlated** with the specific domains formed and the area occupied by the domains on the water surface.

❖ Potential Applications and Implications:

- The closely packed **MBP layer** formed at the air-water and solid surfaces fabricated by the LB method may also be considered as protein nano-templates to crystallize **proteins of interest**.
- The study has significant implications for the development of **effective therapies** for neurological disorders such as MS.



Face to Face Centres

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25 April 2023

Kochi Water Metro

❖ Context

- The Kochi Water Metro project is all set to revolutionize transportation in India as it is the country's first-ever water metro system.



❖ Key Highlights:

- The project aims to link ten island communities in Kerala's city with the mainland, resulting in **shorter travel times and more cost-effective transportation**.
- The system boasts a distinct infrastructure and has the capacity to carry over one lakh passengers, making it a significant addition to the state's public transportation system. The Kochi Water Metro is a modern ferry transport project that consists of numerous boats running along **16 routes across Greater Kochi**.
- The boats are equipped with **cutting-edge safety devices** and advanced technology, making the ferry a safer and more efficient way to travel.

- The incorporation of innovative technology enables smooth sailing even in adverse weather conditions.
- Upon the project's completion, the system will feature a total of **38 stations and 78 ferry boats, making it a comprehensive transportation network**.
- The project is being financed by the Kerala state government & a German funding agency called KFW.
- **Significance:** This project is a significant step towards **reducing traffic congestion** and air pollution in the state while providing a **cost-effective and efficient mode** of transportation for the public.

Genome Sequencing and The Genome India Project

❖ Context

- Recently, **Department of Biotechnology (DBT)** said that the exercise to sequence 10,000 Indian human genomes and create a database under the Centre-backed Genome India Project is about two-thirds complete.

❖ Key Highlights

- About **7,000 Indian genomes** have already been sequenced of which, 3,000 are available for public access by researchers.
- Countries including the **United Kingdom, China, and the United States** have launched similar programmes to sequence at least 1,00,000 of their population's genomes.

❖ About Genome Sequencing

- The **human genome is the entire set of deoxyribonucleic acid (DNA)** residing in the nucleus of every cell of each human body. It **carries the complete genetic information** responsible for the development & functioning of the organism.
- The DNA consists of a **double-stranded molecule built up** by four bases – **adenine (A), cytosine (C), guanine (G) and thymine (T)**.
- Every base on one strand pairs with a complementary base on the other strand (A with T and C with G) In all, the **genome is made up of approximately 3.05 billion such base pairs**.
- While the sequence or order of base pairs is identical in all humans, compared to that of a mouse or another species, there are differences in the genome of every human being that makes them unique. The process of deciphering the order of base pairs, to decode the genetic fingerprint of a human is called genome sequencing.
- **The Human Genome Project (HGP)** : In 1990, a group of scientists began to work on determining the whole sequence of the human genome under the Human Genome Project.
 - The first results of the complete human genome sequence were given in 2003.
 - However, some percentage of repetitive parts were yet to be sequenced.
 - The Human Genome Project released the latest version of the complete human genome in 2023, with a 0.3% error margin.

❖ Applications of Genome Sequencing

- Genome sequencing has been used to **evaluate rare disorders, preconditions for disorders, even cancer** from the viewpoint of genetics, rather than as diseases of certain organs.
- Nearly 10,000 diseases — including **cystic fibrosis and thalassemia** — are known to be the result of a single gene malfunctioning.
- It has also been used as a tool for prenatal screening, to investigate whether the foetus has genetic disorders or anomalies.
- In public health, sequencing has been used to **read the codes of viruses**.

❖ Genome India Project

- The Genome India Project is an initiative of the government of India to **sequence the genomes of 10,000 individuals** from diverse ethnic and geographical backgrounds across the country.
- The **project was launched in 2019** and is being carried out by a consortium of Indian institutions, led by the Council of Scientific and Industrial Research (CSIR).

❖ Significance of the Genome India Project

- Creating a **database of Indian genomes** allows researchers to learn about genetic variants unique to India's population groups and use that to customise drugs and therapies.
- The project will help “unravel the genetic underpinnings of chronic diseases currently on the rise in India.”
 - Example- diabetes, hypertension, cardiovascular diseases, neurodegenerative disorders, and cancer.

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World Malaria Day

❖ Context

- **World Malaria Day** is an international observance commemorated every year on **25 April** and recognizes global efforts to control malaria.



❖ Key Highlights

- World Malaria Day 2023 will be marked under the theme **“Time to deliver zero malaria: invest, innovate, implement”**.
- Among other things, **WHO will focus on the third "i" - implement** - and how to maximize the impact of the tools and strategies currently available to reach out to marginalised populations.
- The idea of World Malaria Day was developed from **Africa Malaria Day**.
- Africa Malaria Day is basically an event that has been observed by African governments since 2001, first held in 2008.
- In 2007, at the **60th session of the World Health Assembly**, a meeting sponsored by the World Health Organisation (WHO) proposed that Africa Malaria Day be changed to World Malaria Day.
- In 2021, an estimated 247 million people contracted malaria in 85 countries.
- In the same year, approximately **619 000 people died from the disease**.

• About Malaria :

- Bites from infected mosquitoes cause malaria, a potentially deadly disease.
- It is the **Female Anopheles mosquitoes** that spread the **Plasmodium parasite** through their saliva, which causes malaria.
- There are 5 parasite species that cause malaria in humans, and 2 of these species – Plasmodium falciparum and Plasmodium vivax – pose the greatest threat.
- It is predominantly found in the tropical and subtropical areas of **Africa, South America as well as Asia**.
- Malaria can be more severe in some people than in others. Pregnant women, infants, and children under 5 years of age, as well as HIV/AIDS patients, are particularly at risk.
- Both prevention and cure are possible.

• High Burden Countries :

- The Democratic Republic of the Congo, Ghana, India, Niger and the United Republic of Tanzania.

News in Between the Lines

Misinformation Combat Alliance



❖ Context

- The Misinformation Combat Alliance (MCA), has approached the Indian government to act as a **self-regulating body** to flag fake news online in line with the **IT Rules, 2021**.

❖ Key Highlights:

- The MCA is a network of 14 digital publishers, including **Boom Live, Factly, The Logical Indian, Vishwas News**, and The Quint, with membership open to any organization that applies.
- The proposal aims to help **combat misinformation** that has become a growing concern, especially on social media platforms.
- The MCA's members, who are trained to fact-check news, will be able to flag any suspicious **content online** and share it with **the concerned authorities** for further action.
- Organizations that joined the alliance are expected to **follow a code of conduct** that includes principles such as **accuracy, fairness, impartiality, transparency**, and accountability.
- The MCA is expected to help improve the **quality of news** and information available to the public and promote responsible journalism.

Abhilekh Patal



❖ Context

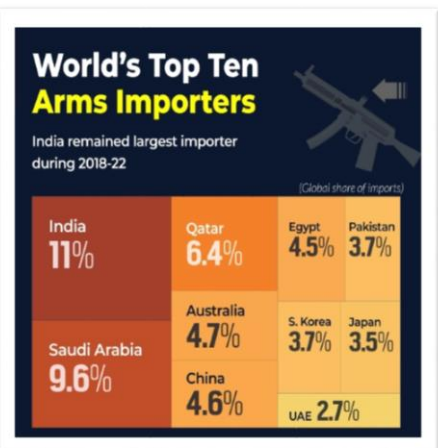
- The Prime Minister, recently praised **“Abhilekh patal”** a portal with over 1 Crore Pages of Historical Records of the National Archives.

❖ Key Highlights:

- It is an initiative of (**National Archives of India's**) NAI to make its Indian Archival Records available to all.
- NAI is an Attached Office of the **Ministry of Culture** and acts as a repository of non-current records of the Government of India.
- It was established in **1891** and is one of the oldest and largest archives in Asia.
- The archives hold a vast collection of **records, documents, manuscripts**, and other historical materials related to the political, social, and economic history of India.

Face to Face Centres

SIPRI



❖ Context

- For 2022, researchers recorded a year-on-year jump of **3.7% in worldwide military expenditure..**

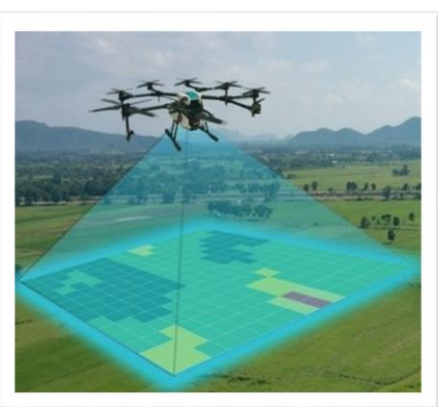
❖ Key Highlights

- The total global military spending reached a **new high of \$2,240 billion in 2022.**
- India's military expenditure **rose by 6 percent in 2022** and the country stood as the fourth-highest spender in the world. India's military spend of \$81.4 billion in 2022 saw a rise compared to 2021, amid the Russia-Ukraine conflict.
- The top three spenders in 2022 were the United States, China and Russia, who accounted for 56% of the world's total share of military expenditure

❖ About SIPRI

- Established in **1966**. It is an **independent international institute** dedicated to **research into conflict, armaments, arms control, and disarmament.**
- SIPRI **provides data, analysis and recommendations**, based on open sources, to policymakers, researchers, media and the interested public. Based in Stockholm, SIPRI is **regularly ranked among the most respected think tanks worldwide.**

SVAMITVA Scheme



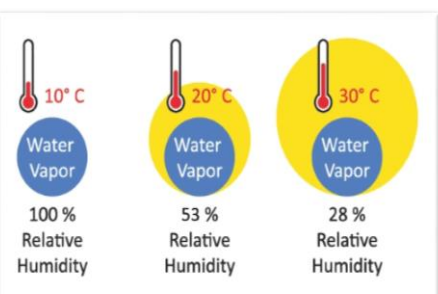
❖ Context

- Recently, the prime minister handed over **SVAMITVA Property Card** to select beneficiaries, symbolizing the attainment of a milestone of 1.25 crore property cards distribution under the **SVAMITVA Scheme** in the country.

❖ About SVAMITVA Scheme

- It is a **Central Sector Scheme, Implemented by-** Ministry of Panchayati Raj. It was launched by the Hon'ble Prime Minister on National Panchayati Raj Day, 24th April 2021 after successful completion of pilot phase of scheme (2020-2021) in 9 states.
- **Aims :** To provide rural people with the **right to document their residential properties** so that they can use their property for economic purposes.
 - It is a **scheme for mapping the land parcels in rural inhabited areas using drone technology and Continuously Operating Reference Station (CORS).**
- **Benefits :** The outcome from the scheme would include **updating the 'record-of-rights' in the revenue/property registers** and **issuance of property cards to the property owners.**
 - This would **facilitate monetization of rural residential assets** for credit & other financial services. Further, this would also have the way for **clear determination of property tax**, which would accrue to the GPs leading to better civic amenities.

Relative Humidity



❖ Context

- Relative humidity is a simple concept as weather phenomena go – but it has significant, far-reaching consequences for how we must take care of ourselves on a hot or wet day.

❖ Key Highlights

- Humidity is the **amount of moisture in the air** around us, and there are three ways to track it. The most common of them is **absolute humidity** : The **mass of water vapour in a given volume of the air and water vapour mixture**, expressed as kg/m³.
 - The absolute humidity in the atmosphere ranges from near zero to roughly 30 grams per cubic metre. The absolute humidity **varies with respect to air temperature**, and pressure changes if the volume is not fixed.
- The 2nd is **specific humidity**, equal to the mass of the moisture divided by the mass of air. It is expressed as a **dimensionless** number (but sometimes also as grams per kilogram, among other similar units.)
- **Relative Humidity** : Relative humidity is a measure of the **amount of moisture or water vapor present in the air**, expressed as a percentage of the maximum amount of moisture that the **air could hold at a given temperature.**
 - A higher percentage indicates that the air-water mixture is more humid.
 - Relative humidity is a crucial metric that is used in weather forecasts as it is an indicator of the likelihood of precipitation, dew or fog.
 - In hot summer weather, a rise in relative humidity increases the temperature of humans by hindering the evaporation of perspiration from the skin.

MCQ Quiz

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