

UPSC Daily Current Affairs| Prelim Bits 27-12-2024

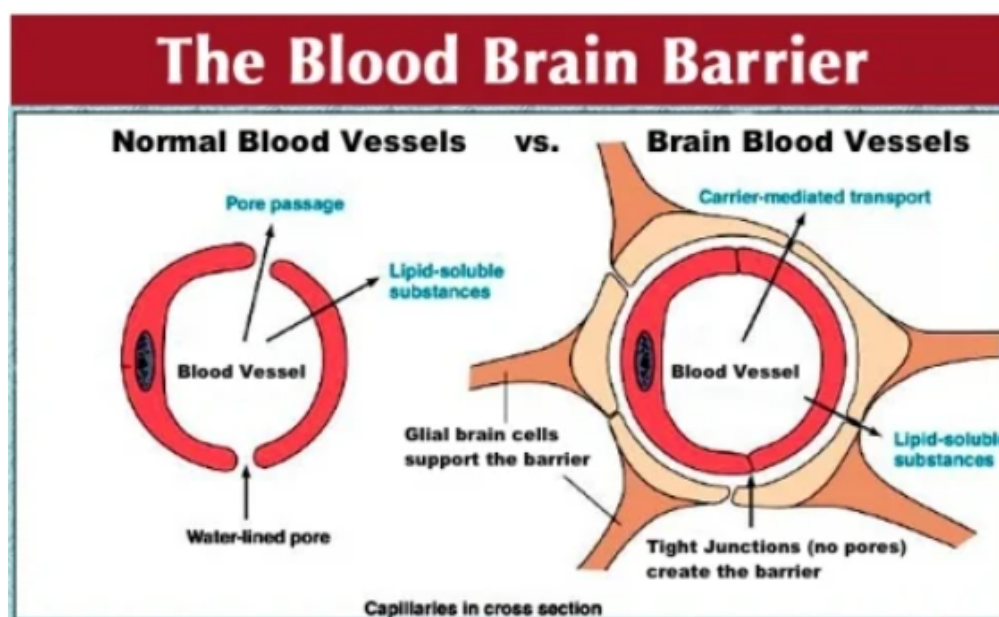
Bacteria in Fish Brain

Why in News?

A new study, published in *Science Advances*, shows that bacteria can not only make their way to the brain, they can thrive there.

- **Study species** - Salmon and Trout.
- **Observation** - Using DNA extraction and microscopic imaging, it was identified that bacteria were living in the fishes' olfactory bulbs and other brain regions.
- **Evasion of blood brain barrier** - Microbes possessed unique adaptations that helped them breach the blood-brain barrier.
- Some produced molecules called polyamines that can open tight junctions in the barrier fluid.
- Others were able to evade immune responses or outcompete their rivals, ensuring their survival in the brain's delicate environs.

Blood-brain barrier (BBB) is a tightly locked layer of cells that defend the brain from harmful substances, germs and other things that could cause damage.



- **Adaptability of bacteria** - Some bacteria seemed to have colonised the brain much before the blood-brain barrier had evolved to its present form.
- Others likely travelled up from the gut or the bloodstream, continuously infiltrating the brain throughout the fishes' lives.

- **Significance of the study** - It opens the door to rethinking the brain's microbiome in vertebrates, including humans.
- If bacteria can thrive on fish brains, it's *possible they may do so on human brains* as well.

Reference

[The Hindu| Bacteria's thriving in Fish Brain](#)

SVAMITVA Scheme

Why in News?

The Prime Minister will grace the e-distribution of 57 lakh SVAMITVA property cards across 46,351 villages in 10 states and 2 Union Territories on 27th December 2024.

- **SVAMITVA** - Survey of Villages and Mapping with Improved Technology in Village Areas.
- **Launched in** - **2020**, on *National Panchayati Raj Day, April 24th*
- **Launched by** - Ministry of Panchayati Raj.
- **Aim** - To drive the economic transformation of rural India by providing property owners in village Abadi areas with a **"Record of Rights."**
- **Objectives**



- **Features** - It uses advanced drone and GIS technology for land demarcation to foster property monetization.
- **Property cards** are seamlessly accessible to beneficiaries through the DigiLocker app, which allowing them to view and download their cards digitally.
- There is a centralized online monitoring and reporting dashboard enables real-time tracking of implementation progress.
- It is coupled with the Continuous Operating Referencing System (CORS) network.

Continuous Operating Referencing System (CORS) network to produce high-resolution maps swiftly and accurately, revolutionizing the process of rural land demarcation.

- **Coverage** - 31 States/UTs have on-boarded the Scheme.
- It have distributed **57 lakh SVAMITVA property cards** across 46,351 villages in 10 States and 2 Union Territories as of 2024.
- Drone survey has been completed in 3.17 lakh villages.
- So far, 2.19 crore property cards have been prepared for nearly 1.49 lakh villages.



Reference

[PIB| SVAMITVA Scheme](#)

Impact of Warming Waters on Marine Life

Why in News?

According to a recent analysis by Down To Earth (DTE), nearly 20% of species residing in UNESCO's World Heritage marine sites have lived in unsuitable warm waters.

- **Global sea surface temperature (SST)** – At present, it is roughly 1 degrees Celsius higher than 140 years ago, according to National Oceanic and Atmospheric Administration.
- The warmest future climate scenario or SSP 8.5 (best estimate projected warming of 4.4°C by the end of the century).
- **Impact** – Ocean heat content has impacted all the 6 major oceans since 1998.
- But the most significant warming has been in the southern oceans.
- **Induce migration** – Ocean warming is shifting marine species into cooler and deeper waters from their natural habitats.
 - Warming waters have compelled white-beaked dolphins found in cooler North Atlantic waters to move north-west from the southern areas during 1991-2017.
- **Impacts reproduction of mammals** – Female sperm whales are unable to conceive at their known rates due to warm waters.
- **Affect survival rates of mammals** – As species migrate for new suitable waters, they

become more vulnerable to new pathogens.

- **Affect water movement** - It impacts oxygen levels between the surface waters and deeper waters that naturally circulates, providing nutrients to marine species.
- **Alter species behaviour** - For instance, bacteria which use oxygen as fuel has now *switched to nitrate*, eventually releasing nitrogen gas and impacting water and atmosphere characteristics.
- **Thermal limit breaching** - 881 of 4,406 species studied have breached their thermal limits includes.
- UNESCO's eDNA Expeditions inventoried 21 of 51 marine sites have exceeded their living thermal limits.

Location	Species living beyond their thermal limits
Coiba National Park, Panama	26.6%
Everglades National Park, US	24.4%
Banc d'Arguin National Park, Mauritania	23.9%
Sundarbans, Bay of Bengal	19.8%

Environmental DNA (eDNA) is an on-invasive sampling method developed by UNESCO, maps ocean life and create an inventory of marine biodiversity in 21 of its 51 World Heritage marine sites.

References

1. [Down to Earth| Impact of Warming Waters on Marine Life](#)
2. [UNESCO | World Heritage Marine](#)
3. [UNESCO| Environmental DNA Expeditions](#)

Vaccine for Cancer & Neoantigens

Why in News?

Recent reports in Russia's state-run news agency claimed that Russian scientists have developed an mRNA vaccine that has shown the ability to suppress tumour development and metastasis in pre-clinical trials.

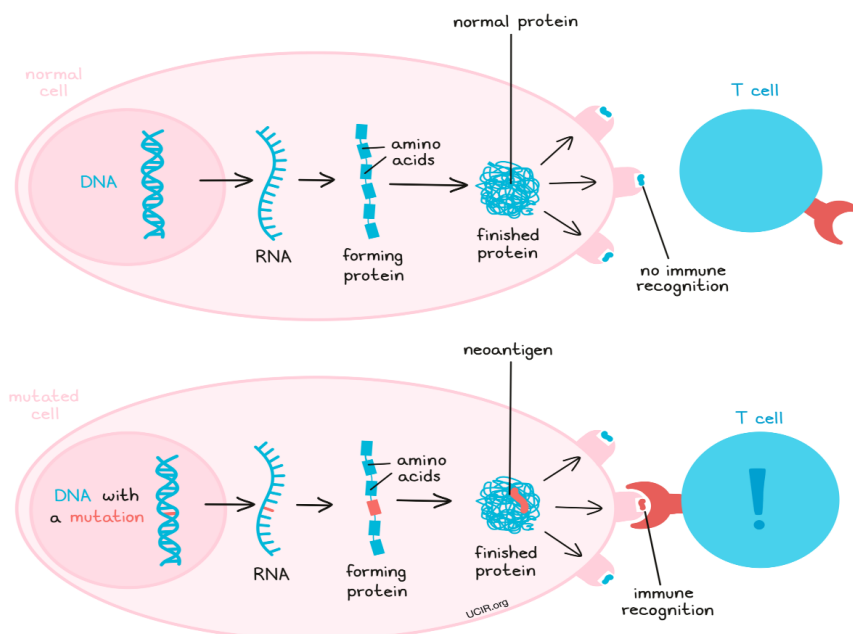
- **Vaccine** - A substance or group of substances meant to cause the immune system to respond to harmful pathogenic microorganisms.
- **Vaccination** - The process of using a vaccine to stimulate the immune system to provide protection against a disease.
- **Cancer vaccine** - Unlike vaccines for infections that are given to healthy individuals to protect them from disease, cancer vaccines are given to *those who already have certain types of cancers*.

Cancer is a disease in which some of the body's cells grow uncontrollably and spread to other parts of the body.

- **Approach** — They can be given in combination with other treatments for better outcomes or they can be given for maintenance to prevent relapse.
- The personalised vaccine was developed by collecting the patients' immune cells, exposing it to a protein found in high levels in prostate cancer cells, and then giving it back to patients.
- However, it extended the patient's survival by only 4 months.
- **Vaccine preventable Cancers** - There are at least 2 cancers whose incidence can be reduced by vaccinating against 2 pathogens.
- Preventing chronic hepatitis B infection with vaccination can bring down the incidence
 - Cervical Cancer
 - Liver Cancer

Cervavac is India's 1st indigenous quadrivalent human papillomavirus vaccine (qHPV) vaccine, and intended to protect women against cervical cancer.

- **Existing vaccines** - The only cancer vaccine approved by the US Food and Drug Administration is Sipuleucel-T, for the treatment of prostate cancer.
- **Russian mRNA vaccine** - It can be "personalised" based on the genetic analysis of each person's tumour to identify mutations called neoantigens.
- **Neoantigens** - A new protein that forms on cancer cells when certain mutations occur in tumor DNA.
- **Significance** - They may play an important role in helping the body make an immune response against cancer cells.



Reference

[The Indian Express| Russian vaccine for Cancer](#)

One Liners 27-12-2024

History, Art and Culture

Arittapatti village

- **Location** - Madurai, Tamilnadu.
- It is *1st Biodiversity heritage site of Tamilnadu.*
- **Ecological importance** - It hosts wildlife such as the Indian pangolin, slender loris & pythons.
- It is home to approximately 250 bird species, including 3 prominent raptors - the Laggar Falcon, Shaheen Falcon, and Bonelli's Eagle.
- **Historical importance** - It boasts numerous megalithic structures, *Tamil Brahmi inscriptions, Jain beds & rock-cut temples* that date back 2200 years.

Geography

Kilauea

- It is an *active shield volcano.*
- **Location** - Hawaiian Islands.
- It is located within Hawaiian Volcanoes National Park.

Polity & Governance

PRAGATI

- It is ICT-based multi-purpose and multi-modal platform.
- **PRAGATI** - Pro-Active Governance and Timely Implementation.
- **Launched in** - *2015*, involving Centre and State governments.
- It is also a robust system for bringing e-transparency and e-accountability with real-time presence and exchange among the key stakeholders.

Town Official Language Implementation Committee (TOLIC)

- It is a body formed in various cities throughout India to encourage the adoption of Hindi as the official language.
- **Role** - They are tasked with *monitoring the execution of the Official Language Policy* within their designated regions.
- Their efforts focus on enhancing the use of Hindi in government agencies, public institutions, and broader public arenas.

Agriculture

National Rainfed Areas Authority

- **Role** - To support rainfed areas by analyzing investment types by different states and schemes.
- **Aim** - To motivate states to invest more in these areas, ensuring that the amount of investment is less compared to their requirements and vulnerability.

Environment

Cephalopods

- **Cephalopods** - They are any of the class of sea animals that have a large soft head, large eyes and eight or ten long thin legs.
- Cephalopod literally means "head foot" in Greek, a reference to the way the cephalopod's head connects to its many arms.
- **Speciality** - These creatures are known for their advanced intelligence and complex behaviors.
- **Examples** - Squid, octopus, cuttlefish, or nautilus.

Oriental dollarbird

- **Scientific Name** - *Eurystomus orientalis*.
- **Morphology** - It has distinctive pale blue or white, coin-shaped spots on its wings.
- **Distribution** - Australia to Korea, Japan and India.
- **IUCN Status** - Least Concern.

UNESCO World Heritage Marine Programme

- **Objective** - To establish effective conservation of existing and potential marine areas of Outstanding Universal Value to ensure that they will be maintained and thrive for generations to come.
- **Goals** - To enable effective management and to create an international network of World Heritage marine sites.
- There are currently 51 marine sites participating in the Programme across 37 nations.
- **In India** - Sundarbans National Park.

Security

SLINEX 2024

- **SLINEX** - Sri Lanka-India Naval Exercise.
- **2024** - In Visakhapatnam.
- **Focus on** - Surface and air assault drills, weapons firing, seamanship and shipping development, along with maneuvers and cross-deck flight operations.
- **Goals** - It include strengthening cooperative efforts between the two nations' navies for multi-dimensional maritime operations, fostering better mutual understanding, and sharing best practices and procedures.

Science

CSIR

- **CSIR** - Council of Scientific and Industrial Research (CSIR).
- It is a leading R&D institution in India, significantly contributing to scientific and industrial advancement.
- **Established in** - 1942
- **Mission** - To improve human welfare through innovative scientific research and technology.
- **Mandate** - To conduct, support, and promote scientific and industrial research throughout India.
- **Functions under** - Ministry of Science and Technology, Government of India.