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

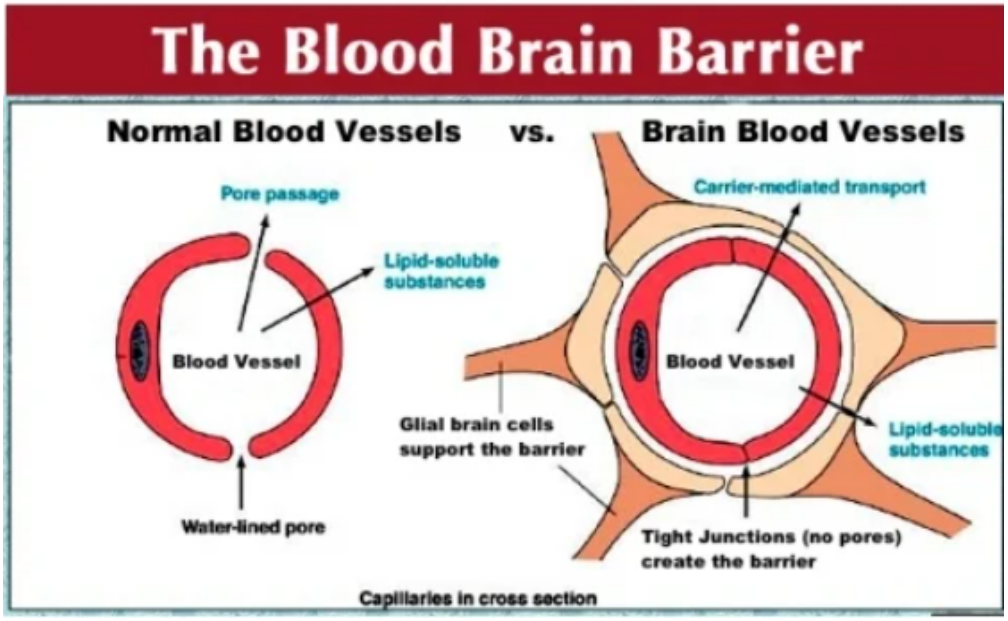
Bacteria in Fish Brain

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

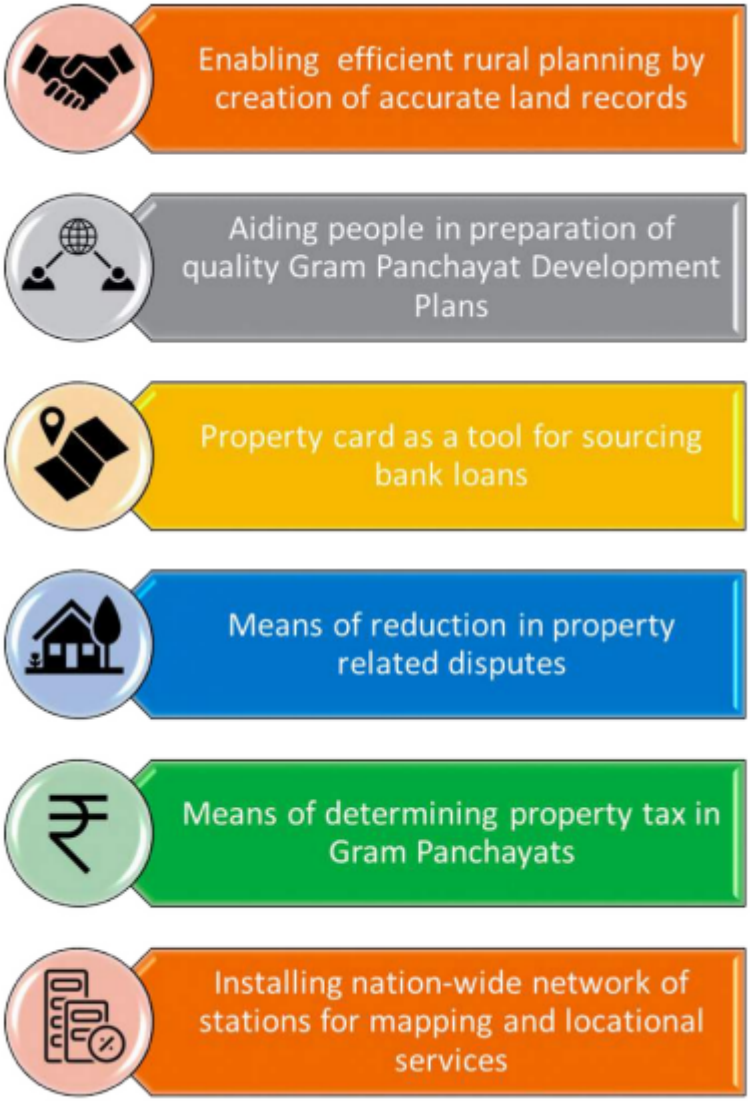
The Hindu| Bacteria's thriving in Fish Brain

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 Improvised 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.

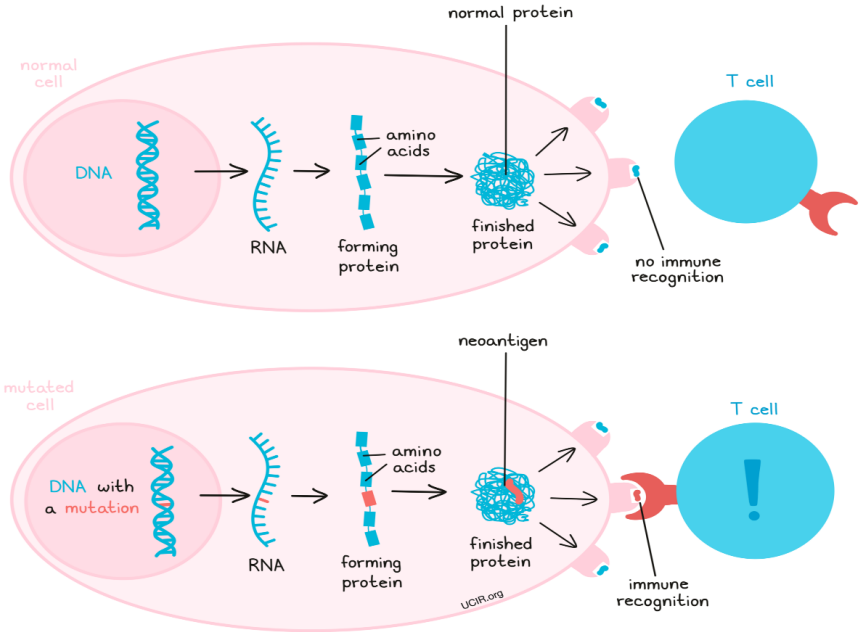
- **Vaccine** – A substance or group of substances meant to cause the immune system to respond to harmful pathogenic microorganisms.
- **Vaccination** - The process of using a vaccine to stimulate the immune system to provide protection against a disease.
- **Cancer vaccine** – Unlike vaccines for infections 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

Kīlauea

• 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

• **Scientifica 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.

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