Prelim Bits 26-01-2022 & 27-01-2022 | UPSC Daily Current Affairs

Chances of Long Covid

A team of researchers have identified biological factors that might help predict if a person will develop long COVID.

- The study has found 4 factors that could be identified early in a person's coronavirus infection that appeared to correlate with increased risk of having lasting symptoms weeks later.
- A long COVID is also known as post acute sequelae of COVID-19 (PASC).
- The four factors that were associated with the long COVID are
    1. Level of coronavirus RNA in the blood early in the infection, an indicator of viral load,
    2. Presence of certain auto-antibodies - antibodies that mistakenly attack tissues in the body as they do in conditions like lupus and rheumatoid arthritis,
    3. Reactivation of Epstein-Barr virus, a virus that infects most people, often when they are young, and then usually becomes dormant.
    4. The final factor is having Type 2 diabetes.
- **Significance** - These findings might suggest ways to prevent or treat some cases of long COVID, including the possibility of giving people antiviral medications soon after an infection has been diagnosed.

Reference

1. https://indianexpress.com/article/explained/long-covid-factors-research-explained-7743205/
2. https://www.the-scientist.com/news-opinion/studies-identify-risk-factors-for-long-covid-69648

Quick Reaction to Negative Smells

Researchers have found that negative smells associated with unpleasantness or unease are processed earlier than positive smells and trigger a physical avoidance response.

- This cognitive process is not only **unconscious** but is also **extremely rapid**. This goes against the conventional wisdom that unpleasant smells associated with danger is a conscious cognitive process.
- The olfactory organ takes up about 5% of the human brain and enables us to distinguish between different smells.
- In humans, the olfactory sense is important for detecting and reacting to potentially harmful stimuli.
- For the first time, the researchers have identified neural mechanisms that are involved in the conversion of an unpleasant smell into avoidance behaviour in humans. This conversion is done by the olfactory bulb.

Olfactory bulb is the first part of the rhinencephalon (literally "nose brain").

It has direct connections to the important central parts of the nervous system that helps us detect and remember threatening and dangerous situations and substances.

It processes smells and in turn can transmit signals to parts of the brain that control movement and avoidance behaviour.

- In the study, the researchers have found that the bulb reacts specifically and rapidly to negative smells and sends a direct signal to the motor cortex within 300 milliseconds.

Reference

1. https://www.thehindu.com/sci-tech/science/what-makes-humans-react-quickly-to-negative-smells/article38037745.ece
2. https://www.sciencedaily.com/releases/2021/10/211014100139.htm

Basal Stem Rot Disease

Researchers from Kerala have identified two new fungi species from the genus Ganoderma - G. keralense and G. pseudoapplanatum - that are associated with coconut stem rot.

- By making the DNA barcodes of these two fungi species publicly available, they have enabled future studies can use it for early detection of the pathogen.
- Butt rot or Basal Stem Rot (BSR) disease is one of the major obstacles in oil palm cultivation.
- The BSR disease of coconut is known by several names in different parts of India - Ganoderma wilt (Andhra Pradesh), Anaberoga (Karnataka) and Thanjavur wilt (Tamil Nadu), to mention a few.
- **Symptoms** - The infection begins at the roots, but symptoms include discolouration and rotting of stem and leaves.
- In the later stages, flowering and nut set decreases and finally the coconut palm (Cocos nucifera) dies.
- A reddish brown oozing has been reported only in India. Once infected, recovery of the plants is not likely.

Basal Stem Rot causes a huge loss: By some estimates made in 2017, in India, around 12 million people are said to depend on coconut farming.

- Another sign of infection is presence of shelf-like “basidiomata” - the fruiting or reproductive structures of the fungus, on the tree trunks.
- The basidiomata of Ganoderma bear reproductive propagules (spores) which are dispersed through wind and sometimes with the help of insects.
- Since the fungus is microscopic, it is only detected after the symptoms start manifesting or when the reproductive structures are borne, which can be too late.

Reference

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2. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5051558/#:~:text=In%20Southeast%20Asia%

2C%20basal%20stem,Malaysia%20as%20well%20as%20Indonesia.

Sela Tunnel Project

The Border Roads Organisation (BRO) conducts final blast concluding all excavation on Sela Tunnel Project.

- Started in 2019, the Sela Tunnel Project is located in the West Kameng District of Arunachal Pradesh.
- The Sela tunnel is a part of the Balipara-Charduar-Tawang (BCT) Road, one of the key strategic projects near the Chinese border.
- Once completed, it will become the world's longest bi-lane road tunnel.
- It will be a lifeline as it will provide all weather connectivity to Tawang.
- The project comprises of,
    1. Tunnel 1, which is a 980 m long single tube tunnel and
    2. Tunnel 2, which is a 1555 m long twin tube tunnel.
- The project also includes construction of an approach road of 7 kms to Tunnel 1, which takes off from BCT Road and a link road of 1.3 kms, which connects Tunnel 1 to Tunnel 2.

Reference

1. https://pib.gov.in/PressReleasePage.aspx?PRID=1791764
2. https://www.hindustantimes.com/india-news/arunachal-pradesh-s-sela-tunnel-project-enters-decisive-phase-defence-ministry-10164287726394html
3. https://timesofindia.indiatimes.com/india/strategic-sela-tunnel-for-tawang-to-be-completed-by-mid-2022/articleshow/87190700.cms

Bridgmanite

By studying a mineral named bridgmanite, researchers have suspected that Earth's inner heat is dissipating sooner, making it cool faster than expected.

- Bridgmanite is the most volumetrically abundant mineral commonly found between Earth's core and mantle.
- Also known as Silicate perovskite, it makes up 70% of lower mantle.
- Bridgmanite consists of magnesium, iron, calcium aluminum oxide and has a perovskite structure.
- **Structure** - The perovskite structure of the Bridgmanite usually occurs in ABX3.

Type	Component
A	Metal that forms cations - Magnesium or Calcium
B	Metal that forms smaller cations - Silicon or Aluminium
X	Oxygen

- **Study** - About 4.5 billion years ago, the surface of Earth was covered by magma and over the years, its surface has cooled to form the outer crust.
- However, there's still enormous thermal energy in Earth's core and mantle which governs plate tectonics, earthquakes, and volcanism.
- Radiative thermal conductivity - one of the fundamental heat conduction mechanisms - is strongly dependent on the colour (opaqueness).
- So, optical absorption measurement of the bridgmanite was applied under high-pressure and high-temperature conditions that prevail in the Earth's core-mantle boundary region.

- The results showed that the thermal conductivity of bridgmanite was about 1.5 times higher than assumed.
- **Inference** - These findings also suggest that other rocky planets may be cooling and becoming inactive faster than expected.
- On Earth, this cooling will lead to lesser tectonic activities (earthquakes, volcanism, and plate tectonics) in the future.
- However, it is challenging to track how long it will take for the cooling.

Reference

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3. https://www.thehindu.com/sci-tech/science/scientists-find-a-mineral-seen-in-the-depths-of-the-earth-in-a-meteorite/article37256589.ece

