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Reaching Mars with Induced Torpor

- A new study finds that the zebrafish's hibernating habits (induced torpor - a state of reduced metabolic activity) may help humans reach Mars.
- Hibernation is a physiological condition that protects various species against harsh conditions, such as food scarcity and low environmental temperatures.
- **Study** - The researchers induced torpor in zebrafishes and exposed them to radiation like what would be experienced on a 6-month journey to Mars.
- The results showed that induced torpor lowered the metabolic rate within the zebrafish and created a radioprotective effect, protecting against the harmful effects of radiation.
- There was a reduction in metabolism and oxygen concentration in cells promotes less oxidative stress and greater resistance to radiation.
- These insights into how a reduction in metabolic rate could offer protection from radiation exposure could help humans achieve a similar kind of hibernation during long-term space flight.
- So, replicating a similar model of hibernation may protect astronauts against the harsh conditions of space flight by reducing brain function which would cut down on psychological stress, etc.,

Coincidence of Supermoon and Total Lunar Eclipse

- On May 26, 2021, the "supermoon" of 2021 will coincide with this year's only total lunar eclipse after nearly six years.
- **Supermoon** - A supermoon happens when the full moon coincides with the moon's closest approach to Earth in its orbit (perigee). The Moon appears to be brighter but it is also larger than a regular full moon.
- The term supermoon was coined by astrologer Richard Nolle in 1979.
- In a typical year, there may be two to four full supermoons and two to four new supermoons in a row.
- **Total Lunar Eclipse** - It is a celestial event during which the Moon and Sun are on opposite sides of the Earth. A lunar eclipse only takes place when there is a full Moon.

- Because of the total lunar eclipse, the moon will also appear to be red.
- This is because the Earth will block some light from the Sun from reaching the moon and as the Earth's atmosphere filters the light, it will soften the edge of Earth's shadow giving the Moon a deep, rosy glow.
- Blood moon during a total lunar eclipse happens when the Earth passes in between the Sun and the Moon.
- There is another celestial event called "Super Blood Wolf Moon", which is a combination of Full Moon, Perigee, Lunar Eclipse in January month.

Sniffer Dogs can detect Coronavirus

- Two groups of researchers have reported separate findings on sniffer dogs detecting coronavirus infection in humans with amazing accuracy.
- The evidence so far indicates they can be useful in identifying potentially infected people in crowds - but those identified would still need to undergo conventional tests such as RT-PCR.

- **Studies** - A US-based study found that the trained dogs identified urine samples from patients who were positive for SARS-CoV-2, discerning them from samples that were negative for the virus.
- They detected positive samples with 96% accuracy, but their ability to detect false negatives was lower.
- A study funded by the UK government found that trained dogs could identify odour samples from infected people with accuracy up to 94% (comparable with 97.2% for RT-PCR).
- They correctly ignored uninfected samples with accuracy up to 92%.
- **Detection** - Our urine, saliva and sweat release volatile organic compounds, which can have different smells depending on whether a person has an infection or not.
- The dogs are trained to detect these distinctive smells.
- Besides dogs, the UK study also used organic semi-conducting sensors that could distinguish between odours from people with asymptomatic or mild symptoms, and uninfected individuals.

Tropical Cyclone Naming

- Cyclone Yaas is the name of the cyclonic storm that was formed over north Andaman Sea and adjoining east Central Bay of Bengal.
- Oman named this cyclone as 'Yaas', which refers to a tree with good fragrance, the word is similar to Jasmine.
- **Naming** - Cyclones that form in every ocean basin across the world are named by the six regional specialised meteorological centres (RSMCs) and Tropical Cyclone Warning Centres (TCWCs).

- As an RSMC, the India Meteorological Department (IMD) names the cyclones developing over the north Indian Ocean, including the Bay of Bengal and Arabian Sea.
- The IMD is also mandated to issue advisories to 12 other countries in the region on the development of cyclones and storms.
- The WMO/ESCAP (World Meteorological Organisation/United Nations Economic and Social Commission for Asia and the Pacific) started naming the cyclones in the region in 2000.
- The countries that name the cyclones are Bangladesh, India, the Maldives, Myanmar, Oman, Pakistan, Sri Lanka, Thailand, Iran, Qatar, Saudi Arabia, United Arab Emirates and Yemen.
- After each country sent in suggestions, the WMO/ESCAP Panel on Tropical Cyclones (PTC) finalised the list.
- **Guidelines to adopt names of cyclones** -
    a. The proposed name (maximum length=eight letters) of tropical cyclone over the north Indian Ocean should be new.
    b. It must be neutral to politics and political figures, religious believes, cultures and gender.
    c. It must be chosen in such a way that it doesn't hurt the sentiments of any group over the globe
    d. It should be short, easy to pronounce and should not be offensive to any member, or not be very rude and cruel in nature

IEA's Net Zero Emissions Roadmap

- The International Energy Agency's (IEA) released the Net Zero Emissions (NZE) Roadmap named 'Net Zero by 2050'.
- This roadmap is supposed to provide a pathway to bridge the current gap between rhetoric and reality in reducing greenhouse gas (GHG) emissions from the energy and industry sectors.
- The Roadmap has set more than 400 milestones to guide the global journey to net zero by 2050. It is built on three principles:
    1. **Technology neutrality**, with adoption driven by costs, technological readiness, country and market conditions and trade-offs with wider societal goals.
    2. **Universal international cooperation**, in which all countries contribute to net zero, with an eye to a 'just transition' and where advanced economies lead.
    3. **An 'orderly transition'** that seeks to minimise stranded assets 'where possible', while ensuring energy security and minimising volatility in energy markets.
- The IEA NZE strategy would give a 50% chance of staying below 1.5C, if

paired with stringent cuts to non-carbon dioxide GHG and emissions from forestry and land use.

- It recommends for no new oil, gas or coal mines approved for development from 2021 itself, with a phase-out of unabated coal in advanced economies by 2030.
- By 2030, there must be 1020 GW annual solar and wind capacity, clean technology to be demonstrated at scale, 60% of cars to be electric and new buildings to be zero carbon ready and, universal energy access.
- Carrying along this pathway, almost 70% of electricity generated will be from solar and wind, over 90% of heavy industrial production is low emission and more than 85% of buildings are zero carbon ready.

- The Roadmap suggests the following on global electricity generation towards 2050:

a. 714% more renewable and 104% more nuclear.
b. 93% less coal (and all remaining coal with Carbon Capture and Storage (CCS)) and
c. 85% less natural gas (with 73% of that with CCS).

Genome Sequencing to Track Covid Variants

- In early March 2021, the Indian SARS-CoV-2 Genomic Consortia (INSACOG), which conducts genomic sequencing of Covid variants in India, warned of a new and contagious form of the novel coronavirus.
- [Genome sequencing is figuring out the order of DNA nucleotides or bases (As, Cs, Gs, and Ts) in a genome that make up an organism's DNA.]
- The INSACOG began the work by sequencing samples of people who had a travel history from the United Kingdom (UK) and a proportion of positive samples in the community.
- **Findings -** Foreign variants identified were the B.1.1.7 (first identified in the UK) and B.1.351 (first in South Africa) and P2 variants (from Brazil).
- However, some labs flagged the growing presence of variants identified in India that were clubbed into a family of inter-related variants called the double mutant variant B.1.617.
- However, there are many more mutations that contribute in different measures to the virus being able to adapt to human hosts.
- B.1.617 family was marked as an international 'variant of concern' after it was linked to a recent spike in cases in the UK. In March 2021, it was linked to a spurt in cases in Maharashtra.
- B.1.1.7 variant (marked by increased infectivity) is more prevalent in many northern and central Indian States in contrast to southern ones.

Uses of Genome Sequencing

- Beyond identifying patterns, genome sequencing is used to understand the role of certain mutations in increasing the virus's infectivity.
- Some mutations have also been linked to immune escape, or the virus's ability to evade antibodies, and this has consequences for vaccines.
- Labs across the world have been studying if the vaccines developed so far are effective against such mutant strains of the virus.
- In general, the antibodies generated after vaccination were able to neutralise variants. However, there were fewer antibodies produced against the South African, Brazil and the 'double mutant' variant.

Indian SARS-CoV-2 Genomic Consortia

- It is a group of 10 national laboratories that is tasked with flagging the presence of COVID-19 variants that were known to have spiked transmission internationally.
- It has also been tasked with checking whether certain combinations of mutations were becoming more widespread in India.
- The National Centre for Disease Control (NCDC) under the MoHFW was tasked with coordinating collection of samples from the States as well correlating disease with the mutations.

Source: The Hindu, The Indian Express, Down To Earth

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