

## Georges Lemaître contribution

- Georges Lemaître, a Belgian astronomer and cosmologist formulated the modern big-bang theory, which holds that the universe began in a cataclysmic explosion of a small, primeval “super-atom.”
- He first derived "Hubble's law", now called the Hubble–Lemaître law by the IAU,
- Hubble's law, also known as the Hubble–Lemaître law, is the observation in physical cosmology that galaxies are moving away from Earth at speeds proportional to their distance.
- In other words, the farther they are, the faster they are moving away from Earth.
- The velocity of the galaxies has been determined by their redshift, a shift of the light they emit toward the red end of the visible spectrum.
- Hubble's law is considered the first observational basis for the expansion of the universe, and today it serves as one of the pieces of evidence most often cited in support of the Big Bang model
- In physics, a redshift is an increase in the wavelength, and a corresponding decrease in the

frequency and photon energy, of electromagnetic radiation (such as light).

- The opposite change, a decrease in wavelength and simultaneous increase in frequency and energy is known as a negative redshift or blueshift.
- In astronomy and cosmology, the three main causes of electromagnetic redshift are
- The radiation travels between objects which are moving apart
- The radiation travels towards an object in a weaker gravitational potential, i.e. towards an object in less strongly curved (flatter) space-time (gravitational redshift)
- The radiation travels through expanding space (cosmological redshift). The observation that all sufficiently distant light sources show redshift corresponding to their distance from Earth is known as Hubble's law.

## THE HINDU

---

### Whale large size

- New research reveals the genes that likely allowed whales to grow to giant sizes compared to their ancestors (Scientific Reports).
- The findings highlight the role of four genes GHSR, IGFBP7, NCAPG, and

PLAG1, and suggest that they promote large body sizes.

**THE HINDU**

**Rod to divert light**

- A powerful laser aimed at the sky can create a virtual lightning rod and divert the path of lightning strikes, a new study (Nature Photonics) demonstrates.
- The findings may pave the way for better lightning protection methods for critical infrastructure.
- The most common lightning protection device is the Franklin rod, an electrically conducting metal mast that intercepts lightning discharges and guides them to the ground.
- Acting as a virtual, movable rod, a laser beam directed at the sky could offer an alternative.

**THE HINDU**

**Threatened Madagascar biodiversity**

- Madagascar’s biodiversity could take millions of years to recover to levels before the arrival of humans if threatened animal species become extinct (Nature Communications).
- The findings suggest that immediate conservation efforts are needed to

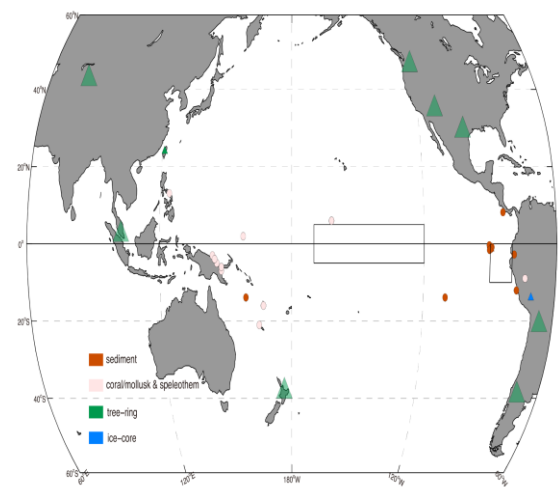
avoid long -lasting biodiversity losses.

- Madagascar is home to a unique set of animal species, including the ring-tailed lemur, and the world’s smallest chameleon.
- Many species may face extinction, owing to human influences.



**THE HINDU**

**What led to unusually low temperature at Ooty’s Fingerpost?**





- Heady winds blow warm water on the sea surface away from the South American mainland, roughly off the coast of Ecuador.
- This heat moving across the Pacific has global consequences.
- Over India, the La Niña can intensify summer monsoons, bring excess rainfall, and cause colder winters.
- In early 2022, the World Meteorological Organisation said the ongoing La Niña is the first in the 21st century to span three consecutive winters.
- But in a break from convention, the coldness is deeper in the south.
- The subtropical westerly jet over North India is pushed southward, allowing the western disturbance to create cold winters in the north.
- But in La Niña years, there is a 'highway' of chill wind coming southward from the Siberian High, "a cold, high- pressure block [of air] that is occupying the central Asian

region and affecting winds coming into India.

- The Siberian High is responsible for the bitter cold of the tundra and has been known to affect the weather from Italy to the Philippines.
- But this time, according to him, it is "anomalously strong"
- It's harder to simulate or predict hyperlocal conditions, but by and large, the La Niña winter plus a very strong Siberian High conspired to create a cooler- than- normal winter in South India.
- The temperature further dropped in Tamil Nadu's interior areas, thanks to the withdrawal of the northeast monsoons from January 12, which allowed the cooler dry-land winds to strengthen.

#### **THE HINDU**

---

#### **Roman concrete**

- The remains of vast networks of roads, aqueducts, ports, and massive buildings of ancient Romans have survived for two millennia.
- Many of these structures were built with concrete: Rome's famed Pantheon, which has the world's largest unreinforced concrete dome and was dedicated in 128 A.D., is still intact.

- A team of investigators from MIT, Harvard University, and laboratories in Italy and Switzerland, has made progress in this field, discovering ancient concrete- manufacturing strategies, says a release.
- Besides pozzolanic material such as volcanic ash from the area of Pozzuoli on the Bay of Naples, they found small millimetres scale bright white mineral features lime clasts which have been long recognised as a ubiquitous component of Roman concrete.



THE HINDU

### India's plan to eradicate measles, rubella

- India had set a target to eliminate measles and rubella (MR) by 2023, having missed the earlier deadline of 2020, due to a variety of reasons, exacerbated by disruptions due to the pandemic.
- An earlier target that was set for 2015 was also missed.

- It was in 2019 that India adopted the goal of measles and rubella elimination by 2023, anticipating that the 2020 goal could not be reached.

#### Why is this target crucial?

- The measles virus is one of the world's most contagious human viruses that kills more than 1,00,000 children every year globally, and rubella is a leading vaccine-preventable cause of birth defects, according to the World Health Organization (WHO).
- Both measles and rubella can be prevented by just two doses of a safe and effective vaccine.
- Mission Indradhanush was launched in 2014 to ramp up vaccinating the unvaccinated population.
- During 2017–2021, India adopted a national strategic plan for measles and rubella elimination and introduced rubella-containing vaccine (RCV) into the routine immunization program, besides launching a nationwide measles-rubella supplementary immunization activity (SIA) catch-up campaign.
- It also transitioned from outbreak-based surveillance to case-based acute fever and rash surveillance, and more than doubled the number

of laboratories in the measles-rubella network.

- The basic plan was to create a very high level of vaccination-induced immunity against both diseases, by inoculating MR vaccine
- The two arms of intervention are vaccination and surveillance.
- Surveillance helps identify places where either virus is still in transmission so that vaccination can be pinpointed there to stop further spread.
- Measles affects the immune system rendering the child vulnerable to other infectious diseases, leading to high mortality over the next two to three years.
- During the pandemic, people switched to work from home, and children connected to schools through laptops.
- This shift led to a surge in demand for laptops and tablets.
- High consumer demand for low-end products, coupled with large orders from tech firms choked chip makers whose factories were also closed during lockdowns.
- The rubella virus is a slower transmitter and the risk of rubella is extended from childhood through adolescence into the reproductive age range. In most individuals, rubella infection
- Affected babies are born with severe birth defects such as cataracts, deafness, heart defects, and developmental delay this is 'congenital rubella syndrome' (CRS).
- Fortunately, CRS is preventable with vaccination if given prior to pregnancy
- The MR vaccine is a combined product, targeting two diseases in one shot.

**THE HINDU**

---