James web telescope

- The James Webb Space Telescope has been hit by a micrometeoroid. NASA says the strike to one of the telescope's primary mirror segments will not affect its performance.
- The space telescope was engineered to withstand micrometeoroid impacts, although the micrometeoroid strike was larger than scientists had modelled
- The James Webb Space Telescope (JWST)
- The James Webb Space Telescope (JWST) is a space telescope designed primarily to conduct infrared astronomy.
- The most powerful telescope ever launched into space, its greatly improved infrared resolution and sensitivity will allow it to view objects too old, distant, or faint for the Hubble Space Telescope.
- This is expected to enable a broad range of investigations across the fields of astronomy and cosmology, such as observations of first stars and the formation of the first galaxies, and detailed atmospheric characterization of potentially habitable exoplanets.
- JWST was launched in December 2021 on a European Space Agency (ESA) Ariane 5 rocket from Kourou, French Guiana, and as of June 2022 is undergoing testing and alignment.
- Once operational, expected about the end of June 2022, JWST is intended to succeed the Hubble as NASA's flagship mission in astrophysics.

THE HINDU

Tonga Volcano

- Researchers are starting to piece together why the Hunga Tonga–Hunga Ha'apai eruption in the South Pacific on January 15 was so explosive.
- Evidence gathered by two groups suggests that when the Tongan volcano's centre collapsed, it spewed an enormous amount of magma that reacted violently with water.
- Hunga Tonga–Hunga Ha'apai is 65 km (40 mi) north of Tongatapu, the country's main island, and is part of the highly active Tonga–Kermadec Islands volcanic arc, a subduction zone extending from New Zealand north-northeast to Fiji.
- Hunga Tonga–Hunga Ha'apai, a submarine volcano in the Tongan archipelago in the southern Pacific Ocean.

THE HINDU

Micro plastic in Antarctica

- Scientists have found micro plastics plastic pieces smaller than a grain of rice in freshly fallen Antarctic snow for the first time, which they said has the potential to influence the climate by accelerating melting of ice.
- The findings, published recently in The Cryosphere journal, brought to light a serious threat to the Antarctic region.

About The Ross Ice Shelf

- The Ross Ice Shelf is the largest ice shelf of Antarctica
- It is several hundred metres thick. The nearly vertical ice front to the open sea is more than 600 kilometres (370 mi) long, and between 15 and 50 metres (50 and 160 ft) high above the water surface.
- Ninety percent of the floating ice, however, is below the water surface.
- Most of Ross Ice Shelf is in the Ross Dependency claimed by New Zealand. It floats in, and covers, a large southern portion of the Ross Sea and the entire Roosevelt Island located in the east of the Ross Sea.
- The ice shelf is named after Sir James Clark Ross, who discovered it on 28 January 1841. It was originally called "The Barrier",

THE HINDU

Quantum tunnelling

- Using the phenomenon of quantum tunnelling, IIT Bombay researchers have demonstrated, for the first time, a spiking neuron network that is highly compact and shows potential for brain-scale implementation
- In second generation, artificial neural networks, neurons represent their state in eight-bit precision.
- This does not mimic biological systems. Instead in a spiking neural network, the next step, the neuron's output state is "spike" (equivalent to a "one") or "no spike" (equivalent to a "zero").
- This has a binary representation and is closer to the natural workings of neurons in the brain.

Quantum tunnelling

- Quantum tunnelling, also known as tunnelling is a quantum mechanical phenomenon whereby a wave function can propagate through a potential barrier.
- The transmission through the barrier can be finite and depends exponentially on the barrier height and barrier width.

Illustration

- Imagine releasing a quantum mechanical particle, like an electron or proton, into a space on one side of a potential energy hill. Since you're sure that the particle can't escape it's not energetic enough to climb over the hill you leave it to its own devices.
- But when you go back to check on it, the particle is gone. You find it happily sitting on the other side of the hill, having sneaked straight through it. Tunnelling particles can simply pass through energy barriers they don't have the energy to surmount.
- Semiconductors, transistors and diodes wouldn't work without it.
- Tunnelling is the reason the sun shines.
- Most stars fuse protons into helium nuclei, expelling enormous amounts of energy in the process. The problem is that, while our sun is hot, it's not hot enough to give the sun's protons enough energy to overcome their mutual electrostatic repulsion. But the tiny tunnelling probability 1 in 1028 – means that some particles still make it through their repulsive barrier.
- Since the sun has vast amounts of hydrogen, this tiny probability translates in 1038 fusion events per second producing enough light and heat to make life on Earth possible.

THE HINDU

FATF

What is the FATF?

- The Financial Action Task Force is an international watchdog for financial crimes such as money laundering and terror financing.
- It was established at the G7 Summit of 1989 in Paris to address loopholes in the global financial system after member countries raised concerns about growing money laundering activities.
- In the aftermath of the 9/11 terror attack on the U.S., FATF also added terror financing as a main focus area.
- This was later broadened to include restricting the funding of weapons of mass destruction.
- The FATF currently has 39 members.
- The decision-making body of the FATF, known as its plenary, meets thrice a year. Its meetings are attended by 206 countries of the global network, including members, and observer organisations, such as the World Bank, some offices of the United Nations, and regional development banks.
- The FATF sets standards or recommendations for countries to

achieve in order to plug the holes in their financial systems and make them less vulnerable to illegal financial activities.

- It conducts regular peer-reviewed evaluations called Mutual Evaluations (ME) of countries to check their performance on standards prescribed by it.
- The reviews are carried out by FATF and FATF-Style Regional Bodies (FSRBs), which then release Mutual Evaluation Reports (MERs).
- For the countries that don't perform well on certain standards, time-bound action plans are drawn up.
- Recommendations for countries range from assessing risks of crimes to setting up legislative, investigative and judicial mechanisms to pursue cases of money laundering and terror funding.

What are FATF's 'grey' and 'black' lists?

- While the words 'grey' and 'black' list do not exist in the official FATF lexicon, they designate countries that need to work on complying with FATF directives and those who are non-compliant, respectively.
- At the end of every plenary meeting, FATF comes out with two lists of countries.
- The grey countries are designated as "jurisdictions under increased monitoring", working with the FATF to counter criminal financial activities.
- For such countries, the watchdog does not tell other members to carry out due-diligence measures vis-a-vis the listed country but does tell them to consider the risks such countries possess.
- Currently, 23 countries including Pakistan are on the grey list.
- As for the black list, it means countries designated as 'high-risk jurisdictions subject to call for action'.
- In this case, the countries have considerable deficiencies in their AML/CFT (anti-money laundering and counter terrorist financing) regimens and the body calls on members and non-members to apply enhanced due diligence.
- In the most serious cases, members are told to apply counter-measures such as sanctions on the listed countries.
- Currently, North Korea and Iran are on the black list. Being listed under the FATF's lists makes it hard for countries to get aid from organisations like the International Monetary Fund (IMF), Asian

Development Bank (ADB), and the European Union.

- It may also affect capital inflows, foreign direct investments, and portfolio flows.

THE HINDU

OIC

What is the OIC?

- The OIC claims to be the "collective voice of the Muslim world". It was established at a 1969 summit in Rabat (Morocco) after what it describes as the 'criminal arson' of Al-Aqsa Mosque in the disputed city of Jerusalem.
- The OIC endeavours to establish solidarity among member states, support restoration of complete sovereignty and territorial integrity of any member state under occupation; protect, defend and combat defamation of Islam, prevent growing dissention in Muslim societies and work to ensure that member states take a united stand at the UN General Assembly, Human Rights Council and other international fora.
- The OIC has consultative and cooperative relations with the UN and other inter-governmental organisations to protect the interest of Muslims, and settle conflicts and disputes involving member states, among them being the territorial conflict between Armenia and Azerbaijan and the status of Jammu & Kashmir.
- Presently based in Jeddah, the organisation plans to permanently move its headquarters to East Jerusalem once the disputed city is 'liberated.

How does the OIC function?

- The Islamic Summit, composed of Kings and heads of state, is the supreme authority of the organisation.
- Convening every two years, it deliberates, takes policy decisions, provides guidance on issues relevant to the organisation and considers issues of concern to the member states.
- The Council of Foreign Ministers is the chief decision-making body and meets annually to decide on how to implement the OIC's general policies. In addition, this council also appoints, for a period of five years, the Secretary General, who is the chief administrative officer of the grouping.
- The Secretary General follows up on implementation of the decisions, directs attention to competent

organs' specific issues of concern, creates a channel for coordination among the varied organs and submits annual reports on the work undertaken.

- UN members with a Muslim majority can join the organisation. The membership is to be ratified with full consensus at the OIC's Council of Foreign Ministers.
- The OIC is financed by the member states proportionate to their national incomes.

What has been the nature of India's relationship with the OIC?

- India's association with the 57-nation grouping has not been easy. Even though the country has good relations with the United Arab Emirates (UAE) and Saudi Arabia, its membership and engagement has been constantly challenged by Pakistan.
- In 1969, Islamabad's opposition to Indian participation at the first OIC Plenary resulted in the Indian delegation being turned back from the venue at the last minute.

- **What have been the criticisms against the OIC grouping?**

- Brookings Institution analyst Turan Kayaoglu wrote in 2020 that the OIC had become a premise for 'window dressing', more interested in the rights of Muslim minorities in places such as Palestine or Myanmar than the human rights violations of its member states.
- The author noted that the body lacks power and resources to investigate human rights violations or enforce its decisions through signed treaties and declarations.
- Experts have also pointed to the fact that the organisation is largely restricted to arbitrating in conflicts where both parties are Muslims.
- This is because the organisation is centred around Quranic values, which, it believes, makes it a qualified arbitrator.

THE HINDU

Egg in egg phenomena

- A team of researchers from the University of Delhi has discovered a unique set of fossilised dinosaur eggs, with one egg nesting within the other. While eggs-within-eggs are a rare phenomenon, they are so far known to occur only in birds and never known in reptiles.
- This discovery brings out newer connections between reptilian and avian evolution.

- The findings, published in the journal Scientific Reports, talk about the "egg-in egg" phenomenon in a titanosaurid dinosaur egg found at Bagh in Madhya Pradesh's Dhar district.
- Dinosaurs of the Sauropod family were among the largest land animals that ever lived and widespread millions of years ago in the territory that is now India.
- Fossils of these animals have been found in Gujarat, Madhya Pradesh and Meghalaya.

THE HINDU

