

### NEWSPAPER HIGHLIGHT

In 2019, astronomers of the Event Horizon Telescope captured the first ever image of a supermassive black hole (M87\*) which was located at the centre of a galaxy Messier 87 (M87). This black hole is calculated to be 6.5 billion times the Sun's mass and is 55 million light years away from the Earth. The discovery set the world of astronomy on fire and also found a mention in the "popular information" section of the announcement of the Nobel Prize in physics for 2020. Now, a paper published in The European Physical Journal brings in an alternative explanation for the compact object that was imaged by the Event Horizon Telescope. The authors say it (M87\*) is not necessarily a black hole but could even be a "naked singularity with a gravitomagnetic monopole." When stars much more massive than the Sun reach the end of their lives, they collapse under their own gravity, and the product of this collapse, most astronomers believe is a black hole. A black hole has two parts: At its core is a singularity – a point that is infinitely dense, as all the remnant mass of the star is compressed into this point. Then there is the event horizon – an imaginary surface surrounding the singularity, and the gravity of the object is such that once anything enters this surface, it is trapped forever. Not even light can escape the pull of the singularity once it crosses the event horizon. That is why, we cannot see the singularity at the heart of a black hole but only see points outside the event horizon.

A small subset of extrasolar planets are likely to have thin crusts, a new modelling study published in the Journal of Geophysical Research finds. Since these eggshell planets are unlikely to show plate tectonics, such worlds are unlikely to be habitable, the study surmises. At least three such worlds may have been found so far.

Microbes may have been behind the first stages of coal creation, finds a study published in Science. Studying methoxyl groups in coal samples, researchers showed that organic material eventually becomes coal through the action of anaerobic microbes that consumed the methoxyl groups, transformed the coal and made methane.

A greenish, octahedral shaped diamond that was found decades ago at the Orapa diamond mine in

### DEVASAHAYAM

1.A Man from Tamil Nadu, **who converted to Christianity in the 18th century, is set to become the first Indian layman to be declared a saint by the Vatican for "enduring increasing hardships" to embrace Christianity. Born as Neelakanda Pillai in Nattalam village of Kanyakumari District in Tamil Nadu in 1712, he went on to serve as a soldier in the court of Travancore's Maharaja Marthanda Varma.** Here, he met a Dutch naval commander, who taught him about the Catholic faith. In 1745, soon after he was baptised, he assumed the name 'Lazarus' or 'Devasahayam' meaning 'God is my help'.

2.But he then faced the wrath of the Travancore state, which was against his conversion. False charges of treason and espionage were brought against him and he was divested of his post in the royal administration. While preaching, he particularly insisted on the equality of all people, despite caste differences. This aroused the hatred of the higher classes.

3.He faced harsh persecution and imprisonment after he converted to Christianity, ultimately resulting in his killing in 1752. Devasahayam was declared Blessed in 2012, 300 years after his birth.

### EARTH'S FIRST LANDMASS

1.A new study suggests that the Earth's first continents, known as the cratons, emerged from the ocean between 3.3 billion and 3.2 billion years ago. This new study has challenged the widely accepted view that the continents rose from the oceans about 2.5 billion years ago. It has also found that the earliest continental landmass to emerge may have been Jharkhand's Singhbhum region.

2.The sandstones tell us 'when the first landmasses were formed' and the granite tells us 'how the first landmasses were formed'. Studying these sedimentary rocks gives information about the formation of first landmass, as sedimentary rocks could only form once land broke through the surface of early Earth's oceans.

3.**Sandstones - The study found sandstones in Singhbhum with geological signatures of ancient river channels, tidal plains and beaches over 3.2 billion years old, representing the earliest crust exposed to air.** All these water bodies could have only existed if there was continental land. Thus, it was inferred that the Singhbhum region was above the ocean before 3.1 billion years ago. Patches of the earliest continental land, however, exist in Australia and South Africa, too. The team studied the zircons (with uranium) in the rocks using a technique called mass spectrometry to find the age of the rocks.

4.**Granites - The granites that form the continental crust of Singhbhum region are 3.5 to 3.1 billion years old. They were formed through extensive volcanism that happened about 35-45 km deep inside the Earth.** This process continued on-and-off for several years until all the magma solidified to form a thick continental crust in the area. Due to the thickness and less density, the continental crust emerged above surrounding oceanic crust owing to buoyancy. The earliest emergence of continents may have contributed to a proliferation of photosynthetic organisms, which would have increased oxygen levels in the atmosphere. Once you create land, what you also create is shallow seas, like lagoons.

### 5G TECHNOLOGY

1.Lava International becomes the first Indian brand to launch 5G smart phone under the brand name 'Agni' for domestic consumers. 5G is the fifth-generation wireless technology that operates in the millimeter wave spectrum (30-300 GHz). It is the latest upgrade in the long-term evolution (LTE) mobile broadband networks. 5G mainly works in 3 bands, namely low, mid and high frequency spectrum.

2.**Pros of 5G - 5G can provide higher speed (20 Gbps speed), lower latency and greater capacity than 4G LTE networks. It increases more bandwidth that will help transfer the data as soon as possible. Less tower congestion.**

Botswana contained small black specks that turned out to be a mineral identified in nature for the first time. This discovery was reported in Science, and the mineral, named Davemaite, cannot exist on Earth's surface, but plays a major role in heat flow deep inside the Earth.

Planets that orbit a pair of stars are called circumbinary stars. Though such objects were thought to be confined to science fiction, using NASA's KEPLER and TESS missions data, astronomers have detected 14 such systems so far. Difficult to detect, a 2020 paper in The Astronomical Journal came up with a method. This has been validated with the same group using the method to find the first such planet in TESS data.

The evolution of land plants has been marked by an increase in the complexity of reproductive structures. A recent study has revealed land plants did not evolve gradually over hundreds of millions of years. Instead, they underwent two major bursts of diversification 250 million years apart. The first occurred early in plant history, giving rise to the development of seeds, and the second took place during the diversification of flowering plants, according to a Stanford University release. The Stanford research uses a simple metric to classify plant complexity based on the arrangement and number of basic parts in their reproductive structures. The latest study (Science) has shed light on those changes.

Viruses are ubiquitous, most are innocuous and some, such as SARS CoV2, turn out to be pernicious. Zika virus, first detected in rhesus monkeys in the Zika forest in Uganda in 1947 and then identified in humans after a few years, appears to be repositioning itself. For the first 60 years after detection, only 14 human cases had been reported, from Asia and Tropical Africa. The first ever outbreak of Zika virus was reported in 2007 in the island of Yap (a federated state in Micronesia) in the Pacific. Zika virus received global attention with the start of a major outbreak in Brazil in March 2015, which then spread to many countries in Central and South America and the Caribbean. The outbreak was associated with higher incidences of microcephaly (a condition which results in a small brain in the fetus) as well as the increased neurological symptoms such as Guillain-Barré syndrome and neuropathies in adults and children infected with the virus. On February 1, 2016, Zika virus outbreak was designated a public health emergency of international concern

**3.Cons of 5G** - Limited global coverage, decreased broadcast distance, the upload speeds are not over 100 Mbps when compared to 4G, weakened device batteries, lack of early encryption in the connection process, etc.

### **NAM AT 60 MARKS AN AGE OF INDIAN ALIGNMENT**

1.The birth anniversary of Jawaharlal Nehru this month and the 60th anniversary of the Non-Aligned Movement prompt reflection on Nehru's major contribution to the field of international relations. How did NAM evolve? The concept of not aligning a country's policy with others can be traced to the Congress of Vienna (1814-15) when the neutrality of Switzerland was recognised. The NAM was founded during the collapse of the colonial system and the independence struggles of the peoples of Africa, Asia, Latin America and other regions and at the height of the Cold War. While some meetings with a third-world perspective were held before 1955, historians consider that the Bandung Asian-African Conference is the most immediate antecedent to the creation of NAM. This Conference was held in Bandung in 1955 with the aim of identifying and assessing world issues at the time and pursuing out joint policies in international relations. The principles that would govern relations among large and small nations, known as the "Ten Principles of Bandung" were proclaimed at that Conference.

2.The NAM was formed during the Cold War to create an independent path in world politics that would not result in member States becoming pawns in the struggles between the major powers. The First Summit of the Movement of Non-Aligned Countries was held in Cairo, Egypt in 1961. Abdel Nasser of Egypt, Kwame Nkrumah of Ghana, Shri Jawaharlal Nehru of India, Ahmed Sukarno of Indonesia and Josip Broz Tito of Yugoslavia later became the founding fathers of the movement.

**3.What led to the adoption of NAM by India?** Nehru saw world problems as interlinked but considers India's interests first even before the merits of the case. Nehru was opposed to the conformity required by both sides in the Cold War. His opposition to alliances was justified by American weapons to Pakistan from 1954 and the creation of western-led military blocs in Asia. Non-alignment was the least costly policy for promoting India's diplomatic presence, a sensible approach when India was weak and the best means of securing economic assistance from abroad.

**4.What were the challenges?** The difficulty was always to find a definition of this policy, which caused a credibility gap between theory and practice. In the early years, there was economic dependence on donor countries who were nearly all members of western military pacts. Indian equidistance to both Koreas and both Vietnams was shown by India recognising neither but it recognised one party in the two Chinas and two Germanies. The Treaty of peace, friendship and cooperation between India and the USSR of 1971 due to the Liberation war of Bangladesh came dangerously to a military alliance.

**5.What were the failures of NAM?** Nehru was hesitant earlier because in theory a coalition or movement of non-aligned nations was a contradiction in terms. According to then Defence Minister Krishna Menon, true non-alignment was to be non-aligned towards the non-aligned. Among the members there were varying alignments, non-internalising of their own concepts of human rights and peaceful settlement of disputes without violating the principle of sovereign domestic jurisdiction. Lack of collective action and collective self-reliance, and the non-establishment of an equitable international economic or information order were other failures. The years following Nehru's death, the non-alignment has undergone considerable changes by inclining to greater alignment with the United States at present.

### **DELHI DECLARATION ON AFGHANISTAN**

1.A regional security summit was recently hosted by India. The summit was attended by eight nations including Iran and Russia. This is the third meeting of the Regional Security Dialogue (the earlier two meetings were held in Iran, in 2018 and 2019).

2.Conference was represented by the national security advisors of each country.

3.During the conference, it was announced that Afghanistan & its territories cannot be used to shelter or train terrorists, or to finance any act of terrorism. Countries issued a joint statement, dubbed as "Delhi Declaration on Afghanistan".

**4.The Declaration emphasised on: Secure and Stable**

**(PHEIC) by the World Health Organization (a classification a step before a disease is declared as pandemic).**

**Afghanistan, condemning terrorism, Ensuring Fundamental Rights, collective Co-operation and the role of UN.**