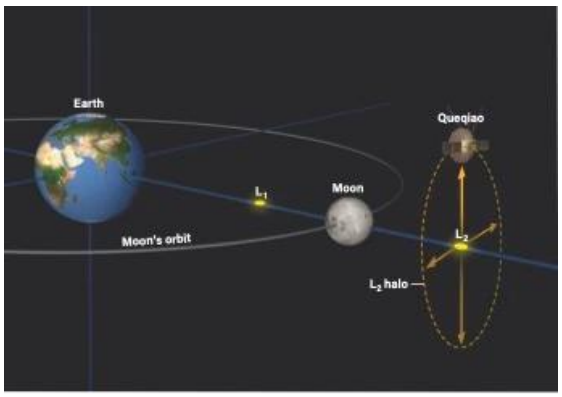
Current Affairs 3rd October 2023 by Saurabh Pandey

Lagrange points



Lagrange points are found along the plane of two objects in orbit around their common center of gravity, where their gravitational forces cancel each other, so that a third body of negligible mass will remain at rest between them.

For example, the combined gravitational force between the sun and the earth equals the centrifugal force required by a satellite or an asteroid to orbit the sun- earth center of gravity.

At this Lagrange point, a satellite will keep its position constant relative to both the sun and the earth.

The three-body problem

But Lagrange's most important contributions were related to the so-called 'three body problem', which investigated the motion of three bodies (with mass) relative to each other in space such as the sun, the earth, and the moon.

The problem question itself is: if you know the starting positions of the sun, the earth, and the moon, can you predict their exact locations at a later date as they move under the influence of each other's gravity?

Lagrange found that the problem could be solved if he assumed the third body was much smaller than the other two larger masses.

This eventually led him to describe the famous five Lagrange points that we know today as L1, L2, L3, L4, and L5.

Points of accumulation

Objects stay undisturbed at L4 or L5 because of a 'restoring force' a force acting against any displacement that prevents them from being nudged away from the stable point.

Because of their stability, however,

L4 and L5 also tend to accumulate a lot of interstellar dust and asteroids called Trojans that zip around the points.

Scientists have detected nearly 10,000 Trojans in the L4 and L5 points of the sun- Jupiter system alone, where gravitational and centrifugal forces prompt the space rocks to follow the giant planet's revolution around the sun.

Aditya- L1 is a space- based observatory that ISRO launched on September 2.

It is now enroute to its designated parking slot at L1 in the sun- earth system. Once it reaches L1 at a distance of 1.5 million km away from the earth the probe will settle into a 'halo' orbit around L1 to acquire an unobstructed view of the Sun.

L1 is already home to four other robotic explorers: NASA's Solar and Heliospheric Observatory Satellite, Deep Space Climate Observatory, Advanced Composition Explorer, and the Global Geospace Science Wind satellite. The point will get even more crowded when three U.S. probes Interstellar Mapping and Acceleration Probe, Near Earth Object Surveyor, Space.

The Hindu

BRICS FUTURE

Six new members were inducted into the BRICS grouping, in South Africa.

It does not provide military or security support to various countries, is not involved in the policing of nations, and does not provide peacekeepers.

Compare this to, say, NATO: European Allies and Canada have invested an extra $350 billion since 2014, with eight consecutive years of increased defence spending

Second, two members of BRICS are China and India, which together contain one- third of the world's population.

The two countries are the fastest-growing economies and are

expected to be among the top three economies of the world by 2030.

Both countries understand that globally, bilateral ties have seen a transformation following the formation of economic blocs such as the European Union or ASEAN, as such blocs accelerate trade and investment.

While India and China have bilateral challenges at the political and diplomatic levels since their stand-off at Doklam in 2017, trade between the two countries has continued to grow significantly

Third, there has been some polarisation between the U.S. and other parts of the world.

The search for an alternative such as the Non- Aligned Movement to tackle Cold War challenges has given hope of a new order; thus, many countries are applying for membership to this group. Six new members were inducted in the last meeting

Fourth, the U.S. dollar has been the dominant global currency all this time.

Both India and China are pushing for more trade, investment, and business in their currencies and together, through BRICS, they can push their own currencies as alternative currencies to the dollar

Finally, the continent that promises economic growth this century is Africa.

The way France has intervened in Niger or the manner in which migrants have been treated in Europe provide Africans with a negative image about Europe.

The Hindu

Nobel prize in medicine

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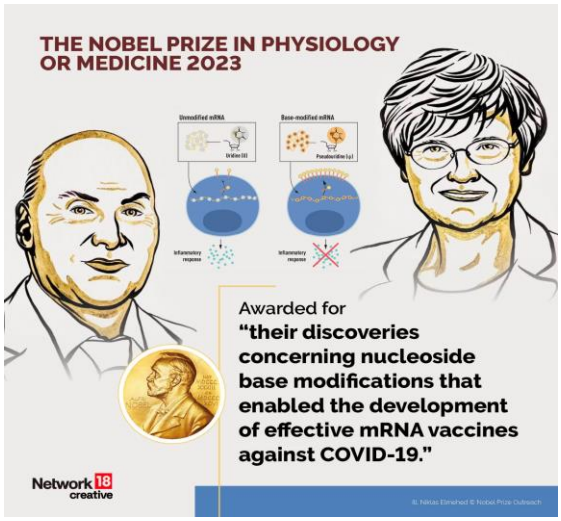
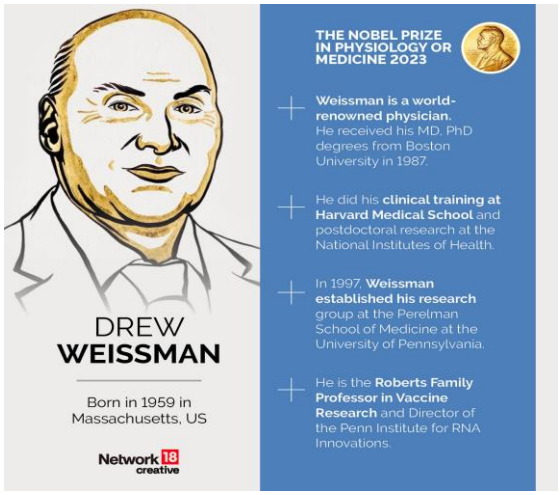
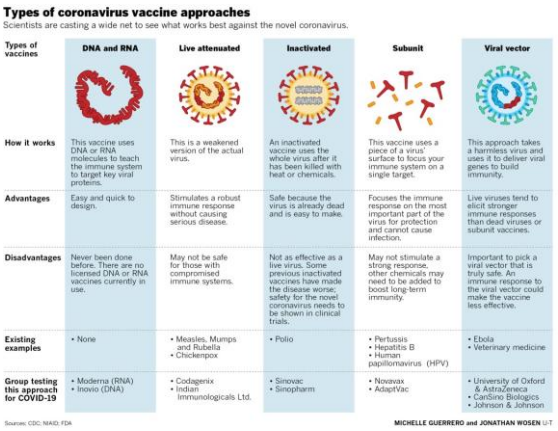
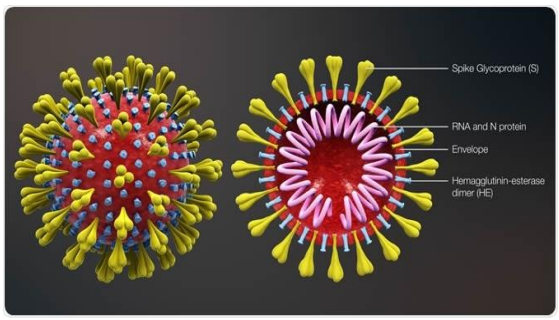




The discoveries by the two Nobel Prize laureates were critical for developing effective mRNA vaccines against COVID-19 during the pandemic that began in early 2020. Through their groundbreaking findings, which have fundamentally changed our understanding of how mRNA interacts with our immune system, the laureates contributed to the unprecedented rate of vaccine development during one of the greatest threats to human health in modern times





Unlike a usual vaccine, RNA vaccines work by the introduction of an mRNA sequence into the host's cells. This mRNA codes for a disease-specific antigen. Once inside a cell, the mRNA instructs the cell to

produce the antigen, which is recognized by the immune system which makes an antibody or cellular response.

It can take years to develop vaccines first in laboratories to show proof-of- concept, then developing a manufacturing process to make stable and a highly pure product to be tested in animals and humans, and finally.

Instead, mRNA vaccine carries the molecular instructions to make the protein in the body through a synthetic RNA of the virus.

The host body uses this to produce the viral protein that is recognized and thereby making the body mount an immune response against the disease.

They are scientifically the ideal choice to address a pandemic because of their rapid developmental timeline.

Considered safe as is non-infectious, non-integrating in nature, and degraded by standard cellular mechanisms.

They are expected to be highly efficacious because of their inherent capability of being translatable into the protein structure inside the cell cytoplasm.

Additionally, mRNA vaccines are fully synthetic and do not require a host for growth, e.g., eggs or bacteria.

Therefore, they can be quickly manufactured in an inexpensive manner under cGMP conditions to ensure their "availability" and "accessibility" for mass vaccination on a sustainable basis.

The Hindu

Norman E Borlaug award for 2023

Swati Nayak became the third Indian agriculture scientist to win the prestigious Norman E Borlaug award for 2023.

Fondly called as “Bihana Didi” (Seed Lady) by local communities in Odisha, Indian agriculture scientist Swati Nayak has perhaps begun to reap the fruits of having lived in tribal villages with farmers and understanding their actual needs.

Nayak became the third Indian agriculture scientist to win the prestigious Norman E Borlaug Award for 2023. The other two Indian recipients are Aditi Mukherjee (2012) and Mahalingam Govindaraj (2022).

The Hindu

Pink Diamond

More than 90% of all the pink diamonds ever found come from a single mine in the Kimberley region of Western Australia: Argyle.

Diamonds are made of carbon atoms arranged in a compact, regular lattice. Clear, perfect diamonds sparkle because light reflects off their internal surfaces.

However, when diamonds are subject to intense pressure deep inside Earth, the lattice of atoms can twist and bend. This causes small imperfections that diffract light and bring colour to the gem.

The Hindu

Indonesia East Java province

Mt Semeru volcano in Indonesia East Java province.

It is the highest mountain on the island of Java. The name "Semeru" is derived from Meru, the central world mountain in Hinduism, or Sumeru, the abode of gods. This stratovolcano is also known as Mahameru, meaning "The Great Mountain" in Sanskrit. It is one of the more popular hiking destinations in Indonesia.

The Hindu