

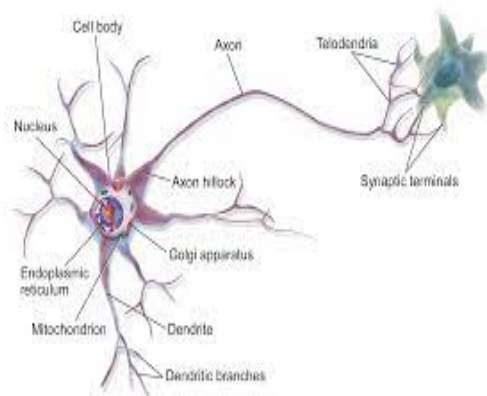
Neural circuit

A neural circuit (also known as a *biological neural network BNNs*) is a population of neurons interconnected by synapses to carry out a specific function when activated.

Multiple neural circuits interconnect with one another to form large scale brain networks.

Neural circuits have inspired the design of artificial neural networks, though there are significant differences.

In the nervous system, a synapse is a structure that permits a neuron (or nerve cell) to pass an electrical or chemical signal to another neuron or to the target effector cell.



The Hindu

James webb Telescope

A pair of independent studies, using recent James Webb Space Telescope observations of carbon dioxide ice on Jupiter's moon Europa, indicate the carbon dioxide originates from a source within the icy body's subsurface ocean.

The findings from both research groups provide new insights into the poorly known composition of Europa's internal ocean.

James Webb Space Telescope (JWST)

The James Webb Space Telescope (JWST) is a space telescope designed primarily to conduct infrared astronomy.

The U.S. National Aeronautics and Space Administration (NASA) led development of the telescope¹ in collaboration with the European Space Agency (ESA), and the Canadian Space Agency (CSA).

The JWST was launched 25 December 2021 on an ESA Ariane 5 rocket from Kourou, French

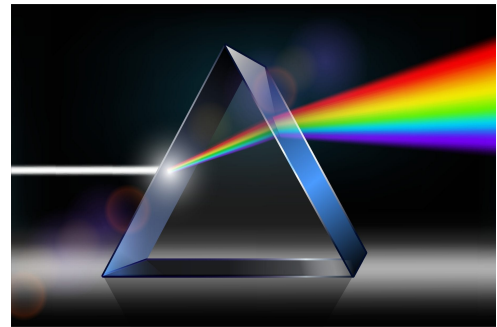
Guiana and is intended to succeed the Hubble Space Telescope as NASA's flagship mission in astrophysics.

The telescope is named after James E. Webb, who was the administrator of NASA from 1961 to 1968 during the Mercury, Gemini, and much of the Apollo programs.

It provides improved infrared resolution and sensitivity over Hubble, viewing objects up to 100 times fainter than the faintest detectable by Hubble.

Spectroscopy is the study of the absorption and emission of light and other radiation by matter.

It involves the splitting of light (or more precisely electromagnetic radiation) into its constituent wavelengths (a spectrum), which is done in much the same way as a prism splits light into a rainbow of colours.



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ORAI1

In preclinical experiments, researchers have established a connection between a calcium channel and the growth of oral cancer cells, as well as the debilitating chronic pain that tumours formed by the cells can cause.

ORAI1 is a calcium release activated channel, and the researchers found that it triggered the expression of genes that encode markers of oral cancer and indirectly raised the excitability of groups of neurons involved in oral pain.

The data opens the door for therapeutic treatment of oral cancers.

The Hindu

Isothermal amplification

A new platform using nucleic acids based diagnostics showcases a way to detect pathogens more quickly in the field.

Through loop mediated isothermal amplification technology, the approach creates nanoballs out of pathogens' DNA that can then be identified through electrical signalling.

Isothermal amplification of nucleic acids is a simple process that rapidly and efficiently accumulates nucleic acid sequences at constant temperature.

The Hindu

Myoinositol

Myoinositol, a cyclic sugar alcohol.

The levels of myoinositol are high over the first two weeks of lactation

and gradually taper off over a period of a few months.

In the early stages, the brain of the newborn is a site of rapid 'wiring', as synapses (or connections between nerve cells) are formed in profusion.

Proper synapse formation during early development lays the foundation for cognitive development; inadequate synapse formation leads to development difficulties in the brain.

The group of Thomas Biederer at Yale (PNAS) also matched their findings on myoinositol induced synapse abundance in cultured rat neurons in test tubes.

Here too, myoinositol promoted the formation of synapses between neurons.

Myoinositol is a cyclic sugar alcohol, about half as sweet as sugar.

It is abundant in the brain, where it mediates the response to several hormones.

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Our body needs inositol to form cell membranes. Our body makes myoinositol from glucose, mostly in the kidneys.

However, our body's requirements go up along with the intake of coffee and sugar, and in conditions such as diabetes.

The bran of grains and seeds contains a precursor of inositol, phytic acid. Almonds, peas and cantaloupes are also rich sources

Draft patent amendment rule

Body blow to pre-grant opposition
The draft patent amendment rules give the controller the power to determine the maintainability of representation of those filing pre-grant oppositions



- Big pharma had questioned the maintainability of petitioners opposing patents, leading to delays. The same can happen with pre-grant opposition
- The present amendments present the most significant challenge to the Indian Patent System since 2005
- Pharma companies are averse to pre-grant opposition. The draft patent amendment rules help them by making the process difficult
- There are innumerable instances when patient groups and civil society organisations have filed pre-grant opposition, leading to rejection of patent extension
- The latest pre-grant opposition ruling that was not in favour of a pharma company is the Bedaquiline drug for MDR-TB patients

Worrying: The draft amendment rules create needless hurdles. SPECIAL ARRANGEMENT

- Currently, the Patents Act explicitly permits "any person" to file a pre-grant opposition without the discretion of the Controller. But as per the draft rules, the Controller will decide maintainability

Currently, the Patents Act explicitly permits "any person" to file a pre-grant opposition without the discretion of the Controller.

But as per the draft patent amendment rules, the maintainability of the petitioners

who file a pre-grant opposition will not be automatic but will be determined by the Controller.

The Hindu

Women reservation bill

[What are the main issues regarding the Bill?](#)

The Opposition has questioned the linking of the implementation of women's reservation with the periodical delimitation exercise as this would mean a prolonged delay in the quota coming into force.

Delimitation, or the readjustment of territorial limits of the Lok Sabha and Assembly constituencies, as well as the number of seats in the Assembly and the Lok Sabha in each State, is a periodical exercise done based on the figures available in the latest Census.

The last delimitation order of the Delimitation Commission was issued in 2008, fixing the boundaries

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of all constituencies.

However, there is currently a freeze on the readjustment of the number of seats in the State Assemblies and the Lok Sabha.

In 2002, Article 82 was amended to the effect that it shall not be necessary to readjust the allocation of Lok Sabha constituencies State wise and the division of each State into constituencies until the figures of the first Census held after 2026 were available.

Another issue raised by the Opposition concerns the question of having a subquota for women from Other Backward Classes (OBCs).

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Global debt

What is global debt?

Global debt refers to the borrowings of governments as well as private businesses and individuals.

Governments borrow to meet various expenditures that they are unable to meet through tax and other revenues.

Governments may also borrow to pay interest on the money that they have already borrowed to fund past expenditures. The private sector borrows predominantly to make investments.

Why is it rising?

Both global debt in nominal terms and global debt as a share of GDP have been rising steadily over the decades.

The rise came to a halt during the pandemic as economic activity turned sluggish and lending slowed down. But global debt levels, it seems, have started to rise again

Most (over 80%) of the rise in global debt in the first half of the year has come from advanced economies such as the U.S., the U.K., Japan, and France.

Among emerging market economies,

China, India and Brazil have seen the most growth in debt

The Hindu

The rise in global debt levels witnessed during the first half of the year is nothing out of the ordinary and does not per se have to mean trouble for the global economy.

In fact, even a simple rise in the total amount of savings in an economy can cause a rise in debt levels as these increased savings are channelled into investments

The IIF attributes the decline in global debt as a share of GDP to the rise in price inflation, which it claims has helped governments to inflate away the debts denominated in their local currencies.

Inflating away of debt refers to the phenomenon wherein the central bank of a country either directly or indirectly uses freshly created currency to effectively pay off outstanding government debt by, for example, purchasing government bonds in the market.