Current Affairs 22nd October 2023 by Saurabh Pandey

Avian influenza

A recent study published in Nature reveals major changes in the ecology and evolution of highly pathogenic avian H5 influenza viruses, including a shift in global distribution.

The findings suggest that the epicentre of these viruses has extended beyond Asia to new regions including parts of Africa and Europe.

Highly pathogenic avian H5N1 virus activity has intensified globally since 2021, infecting and killing increasing numbers of wild birds and poultry, as well as posing a risk to mammals (including humans).

Increasing persistence of avian influenza in wild bird populations is driving the evolution and spread of new strains.

"These results highlight a shift in the Highly Pathogenic Avian Influenza (HPAI) H5 epicentre beyond Asia and indicate that increasing persistence of HPAI H5 in wild birds is facilitating geographic and host range expansion.

The Hindu

Serotonin

A study published recently in the journal Cell, researchers from the University of Pennsylvania, Philadelphia, who led the study, have found reduced levels of serotonin, a neurotransmitter, being associated with Long COVID.

Memory problems, brain fog, and the inability to focus on tasks that people with Long COVID seem to suffer from might be due to reduced serotonin, the authors say.

Serotonin

The scientific name for serotonin is 5-hydroxytryptamine (5-HT) and is present in the nervous system, bowels, and blood platelets.

Serotonin is a neurotransmitter, and some also consider it a hormone. The body uses it to send messages between nerve cells.

Serotonin has a wide variety of functions in the human body. People sometimes call it the "happy" chemical because it contributes to well-being and happiness.

Serotonin appears to affect mood, emotions, appetite, and digestion. As the precursor for melatonin, it helps regulate sleep-wake cycles and the body clock.

The Hindu

Cicada emergence

The periodical mass emergence of cicadas in eastern North American forests can "rewire" forest food webs and initiate a cascade of impacts that propagates throughout the food chain, as per a study that quantified effects of the 2021 Brood X cicada emergence.

The cicadas are a superfamily, the Cicadoidea, of insects in the order.

The Hindu

Hemiptera

The study found that when insect - eating birds have prey in the form of cicadas and thus shift their focus away from their usual repast leaf - eating caterpillars the caterpillars feast more heavily upon the leaves of oak saplings, doubling insect leaf damage.

The Hindu

Current Affairs 22nd October 2023 by Saurabh Pandey

Maximum temperature and nesting

Maximum temperature extremes reduce the nesting success of birds across the United States by nearly 50% in agricultural landscapes but not forests.

The findings show that future warming may exacerbate the negative effects of habitat conversion on bird fitness, among species of conservation concern in human dominated landscapes.

By removing insulating tree canopies or other complex microhabitats, many forms of habitat conversion can expose species to more pronounced climate extremes.

The Hindu

FRBs and Redshift movement

Maximum temperature extremes reduce the nesting success of birds across the United States by nearly 50% in agricultural landscapes but not forests.

The findings show that future warming may exacerbate the negative effects of habitat conversion on bird fitness, among species of conservation concern in human dominated landscapes.

By removing insulating tree canopies or other complex microhabitats, many forms of habitat conversion can expose species to more pronounced climate extremes.

FRBs and Redshift movement

An unusually high energy fast radio burst from a high redshift galaxy has offered new insights into the distant universe, challenging current models of FRB emission.

FRBs are brief pulses of radio emission originating from distant extragalactic sources.

Researchers have localised the source of the particularly luminous

burst FRB 20220610A to a galaxy with a complex morphology located at redshift about 1.01.

This FRB is higher than what is predicted by the Macquart relation.

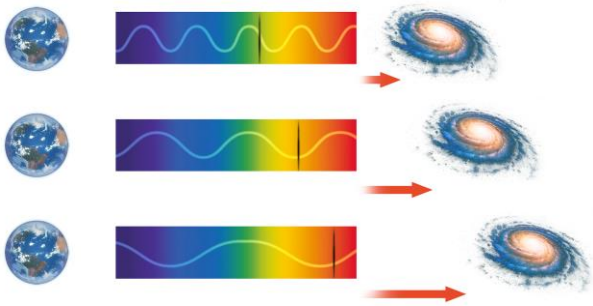
What are FRBs??

In radio astronomy, a fast radio burst (FRB) is a transient radio pulse of length ranging from a fraction of a millisecond to 3 seconds, caused by some high-energy astrophysical process not yet understood.

Astronomers estimate the average FRB releases as much energy in a millisecond as the Sun puts out in three days.

Radio waves are a type of electromagnetic radiation with the longest wavelengths in the electromagnetic spectrum, typically with frequencies of 300 gigahertz (GHz) and below.

What is redshift in astronomy?



The Universe is expanding in the aftermath of the Big Bang explosion 13.7 billion years ago.

During the time that light from an astronomical object has been travelling across space to the Earth, the Universe has grown in size.

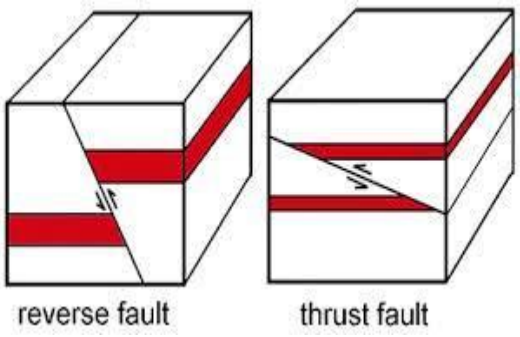
The effect of this is to stretch the 'wavelength' of the light, much as a wave drawn on the fabric of a balloon would be stretched if the balloon were inflated.

The wavelength of red light is about twice that of blue light, so the stretching of visible light shifts it towards the red end of the spectrum: thus the term 'redshift'.

Macquart relation: This relation has been used to measure the cosmic baryon fraction and the expansion rate of the Universe.

The Hindu

Multiplete - earthquake



All four earthquakes occurred on east west striking fault planes that dip to either the north or south.

The earthquakes occurred within the Eurasia plate in an intracontinental mountain belt.

Aftershocks, by default, have magnitudes less than the main event. However, all the four earthquakes near Herat have the same magnitude

Two subsequent earthquakes [on October 11 and October 15] are all approximately the same magnitude, we would call them 'multiplets' rather than main shocks, foreshocks, or aftershocks,"

All the four earthquakes occurred due to thrust faulting, where one block moves up relative to the other, the area where the earthquakes had occurred would experience upliftment.

The Hindu

Mars Quake

The quake, which had a magnitude of 4.7 and caused vibrations to reverberate through Mars for at least six hours, was recorded by

NASA's Insight lander on May 4 2022.

Because its seismic signal was similar to previous quakes known to be caused by meteoroid impacts, the team believed that this event (dubbed 'S1222a') might have been caused by an impact, and launched an international search for a fresh crater.

They conclude that the event was instead caused by the release of enormous tectonic forces within Mars' interior. The results (Geophysical Research Letters), indicate that the planet is much more seismically active than previously thought.

The Hindu

Sikkim floods

What triggered the floods?

Experts point out that the floods in the Teesta river in Sikkim and West Bengal was triggered by a phenomenon called GLOF (Glacial Lake Outburst Flood).

GLOF is a sudden release of water from a lake fed by glacier melt that has formed at the side, in front, within, beneath, or on the surface of a glacier

South Lhonak lake is one of the most studied lakes for GLOF. Sikkim government point out that the collapse of the hydel power dam at Chungthang added to the devastation.

Central Water Commission while approving the project had said that it would be a concrete gravity dam whereas the dam constructed was a rock filled dam that would not be able to withstand huge floods.

The Chungthang dam, which has a majority stake of the State government under Sikkim Urja, has stopped generating electricity and has filed an insurance claim

87 hydroelectricity projects (HEP) of installed capacity of 22,982 (MW) are operational across the Himalayan belt.

Another 30 large HEPs (above 25 MW) with an installed capacity of 11,137 MW are being developed across the Himalayan belt.

Five projects are proposed in Sikkim on the Teesta and other rivers. In Sikkim, the assessed hydro power potential is of 4,248 MW of which about 53.7 % (2,282 MW) has been developed and 24.4 % (1,037 MW) is being constructed, according to a PIB release of March, 2023.

The Hindu

New Safety Dams

India has almost 6,000 large dams and about 80% of them are more than 25 years old and carry safety risks.

A new Dam Safety Act (DSA) was passed in late 2021. O

What are the provisions of the Act?

The Dam Safety Act was tabled in the Rajya Sabha in December 2021, as a response to deficient surveillance and maintenance causing dam failure related disasters.

The Act listed key responsibilities and mandated that national and State level bodies be established for implementation.

It said a National Committee on Dam Safety would oversee dam safety policies and regulations;

A National Dam Safety Authority would be charged with implementation and resolving State level disputes;

The Chairman of the Central Water Commission (CWC) would head dam safety protocols at the national level.

A State Committee on Dam Safety (SCDS) and State Dam Safety Organisation (SDSO) would be set up.

Sikkim formed an SCDS on August 17 with nine members and experts in hydrology and dam design.

What do the States need to do?

Provisions require States to classify dams based on hazard risk, conduct regular inspections, create emergency action plans, institute emergency flood warning systems, and undertake safety reviews and period risk assessment studies.

Importantly, States were asked to report and record incidents of dam failures.

Until now, no statutory provision required systemic reporting of failures and no single agency was tasked with tracking this data.

Is any action taken for failing to comply?

Failure to comply with any provision of the Act is punishable with imprisonment and/or fines, and "if such obstruction or refusal to comply with directions results in loss of lives or imminent danger thereof, [entity] shall be punishable with imprisonment for a term which may extend to two years.

The Sikkim GLOF reveals poor compliance at all levels, from the dam's design to the spillway capacity (which controls the release of water from a reservoir).

The Hindu