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VITAL

- NASA has developed new ventilator tailored specifically to treat COVID-19 patients.
- The device is called VITAL - Ventilator Intervention Technology Accessible Locally.
- VITAL is designed to treat patients with milder symptoms, thereby keeping country's limited supply of traditional ventilators available for patients with more severe COVID-19 symptoms.
- VITAL can be built faster and maintained more easily than a traditional ventilator, and is composed of far fewer parts, many of which are currently available to potential manufacturers through existing supply chains.

LIGO

- The Laser Interferometer Gravitational-Wave Observatory (LIGO) is a large-scale physics experiment and observatory to detect cosmic gravitational waves and to develop gravitational-wave observations as an astronomical tool.
- Two large observatories were built in the United States with the aim of detecting gravitational waves by laser interferometry.
- These can detect a change in the 4 km mirror spacing of less than a ten-thousandth the charge diameter of a proton.
- The initial LIGO observatories were funded by the National Science Foundation (NSF).
- They collected data from 2002 to 2010 but no gravitational waves were detected.
- In 2017, the Nobel Prize in Physics was awarded to Rainer Weiss, Kip Thorne and Barry C. Barish "for decisive contributions to the LIGO detector and the observation of gravitational waves."

Merger of two Black holes

- For the first time since it started functioning, the gravitational wave observatories at LIGO scientific collaboration have detected a merger of

two unequal-mass black holes.

- The event, dubbed GW190412, was detected nearly a year ago, and this is almost five years after the first ever detection of gravitational wave signals by these powerful detectors.
- Subsequent analysis of the signal coming from the violent merger showed that it involved two black holes of unequal masses coalescing, one of which was some 30 times the mass of the Sun and the other which had a mass nearly 8 times the solar mass.
- The actual merger took place at a distance of 2.5 billion light years away.
- The detected signal's waveform has special extra features in it when it corresponds to the merger of two unequal-sized black holes as compared with a merger of equal-sized black holes.
- Pointing out the difference between binary black holes with equal masses and those with different masses, Dominant emission of gravitational waves happens at twice the orbital frequency of the binary.

Zoonotic Diseases

- Zoonotic diseases, also called zoonosis, are illnesses caused by germs that are passed between animals and people.
- According to the United Nations Environment Programme (UNEP), 60% of all infectious diseases in humans are zoonotic, and about 75% of all emerging infectious diseases are zoonotic in nature.
- Emerging pathogens are more likely to be viruses, than any other kind bacteria, parasites, fungi and are more likely to have a broad host range.
- The inevitable interaction between humans and livestock with wildlife exposes the human species to the risk of spillover of potential pathogens.
- For many zoonotic diseases or zoonosis, livestock serve as an epidemiological bridge between wildlife and human infections.
- Among zoonosis that emerged or re-emerged recently, the UNEP counts

1. Ebola,
2. Bird flu (Avian Influenza) ,
3. Middle East Respiratory Syndrome (MERS),
4. Rift Valley fever,
5. Severe Acute Respiratory Syndrome (SARS),
6. West Nile virus,
7. Zika virus disease,
8. COVID-19.

- The UNEP is also very clear that the drivers of zoonotic disease emergence are changes in the environment, usually as a result of human

activities ranging from land use change, changes in animals or human hosts and changes in pathogens, which are programmed to survive, and in the process exploit multiple hosts.
- For instance, bat-associated viruses emerged due to the loss of habitats, it argues.
- Changes in weather patterns, and extreme weather events affect the distribution areas of disease, pathogens and pests.
- Also, changes in human behavior, including travel, conflicts, migration, wildlife trade, urbanization, and dietary and medical preferences, can result in disease emergence, according to researchers at the UNEP.

UNEP

- The United Nations Environment Programme is responsible for coordinating the UN's environmental activities and assisting developing countries in implementing environmentally sound policies and practices.
- UNEP was founded in June 1972 by Canadian businessman and philanthropist Maurice Strong, its first director, following the United Nations Conference on the Human Environment (Stockholm Conference).
- UNEP helps fund and implement specific environmental development projects worldwide, such as reforestation and wetlands restoration.
- UN Environment has aided in the formulation of guidelines and treaties on issues such as the international trade in potentially harmful chemicals, transboundary air pollution, and contamination of international waterways.
- It also maintains a repository of scientific papers and environmental research.
- As a member of the United Nations Development Group, it is responsible for ensuring the world meets the 17 Sustainable Development Goals.
- As a programme of the United Nations, UN Environment is funded solely by voluntary contributions.

One Health Approach

- According to the World Health Organization, ‘One Health’ is an approach to designing and implementing programmes, policies, legislation and research in which multiple sectors communicate and work together to achieve better public health outcomes.
- The areas of work in which a ‘One Health’ approach is particularly relevant include food safety, the control of zoonosis, and combating antibiotic resistance (when bacteria change after being exposed to

antibiotics and become more difficult to treat).
- The concept helps practitioners understand disease determinants, manage risks and optimize interventions.
- Climate scientists argue and epidemiologists agree that 'One Health' is a key principle for the control of zoonotic diseases, antimicrobial resistance, food safety and vector-borne diseases.

Rohtang Pass

- Rohtang Pass (elevation 3,978 m) is located in the state of Himachal Pradesh, It is present on the Pir Panjal Range of Himalayas.
- It connects the Kullu Valley with Lahaul and Spiti Valleys of Himachal Pradesh.
- The Ravi river rises west of the Rohtang pass in the Kullu hills of Himachal Pradesh.
- The world's longest tunnel (8.8km) above 10,000 feet -Rohtang Tunnel (Atal Tunnel) is under construction to connect villages in Lahaul-Spiti (Himachal Pradesh) to the rest of the country even during winters.
- The operation to clear snow is carried out every year as the pass remains snow-bound for almost six months, from mid-November to mid-May, isolating Lahaul and Spiti districts from the rest of the country.
- Recently Border Roads Organization (BRO) opened the Rohtang Pass, three weeks in advance, for transporting essential supplies and relief materials to Lahaul and Spiti districts of Himachal Pradesh amid the lockdown.

Source: The Hindu, News on AIR

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