

# STRIDES

Science, Technology, Research, Innovation & DEvelopmentS

BRINGS NEWS ON S&T DEVELOPMENT FROM DST SUPPORT AND BEYOND

## EDITORIAL

### FROM HEAD OF DST MEDIA CELL

The yearlong Golden Jubilee Celebration of Department of Science and Technology (DST) brought together the 'Gold of the old' – the experiences of both former and present Secretaries of DST in steering the organization and suggesting a way forward.

DST's huge reach and depth in every area of science was discussed along with its role as an agency for transformation of India through S&T.

It was emphasised that as the country evolves to the stage where science is ultimately celebrated by the citizens of the country, the opportunity for a completely new S&T policy framework to reach the unserved and underserved people of the country should be taken up by DST.

This reference to the new policy framework was very timely as the formulation process for the new Science Technology and Innovation Policy is currently being steered by the Office of the Principal Scientific Advisor along with DST through elaborate public consultation processes.

Apart from this, several COVID 19 technologies that had been supported by DST on an urgent basis are rapidly seeing the light of the day. The Birbal Sahni Institute of Palaeobotany, Lucknow, an autonomous institution under DST which recorded the shortest average time to process samples among institutions in India is the featured institution for this month. A range of stories on scientific achievements spanning from Astronomy to Medical science are brought as popular science stories.

—DR AKHILESH GUPTA, EDITOR-IN-CHIEF

## COVER STORY



### PRESENT & FORMER DST SECRETARIES DISCUSS DST'S ROADMAP IN TRANSFORMING INDIA

Secretaries—both former and present, of DST highlighted the milestones achieved so far

by DST and discussed the road ahead at the inaugural panel discussion on 'Remembering 50 Golden years of DST' organized to commemorate the golden jubilee celebration of the department. DST Secretary Professor Ashutosh Sharma pointed out that the establishment of DST has been a turning point for science, technology, and innovation in India and connected to a very wide stakeholder base of S&T in India all the way from school students to Ph.D. to young scientists, R&D labs, Universities, and colleges.

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### NIF RECALLS IT'S ASSOCIATION WITH THE INNOVATION PRESIDENT

The Rashtrapati Bhawan has been a Center of learning and innovation through a variety of non-conventional initiatives such as the annual Festival of Innovation, Innovation Scholar-In-Residence programme, setting up of a permanent exhibition of innovations apart from the hosting of NIF's Biennial National Grassroots Innovation and Outstanding Traditional Knowledge awards and annual exhibition of Innovations. Many of these were initiated by an exceptional personal interest of the late President Shri Pranab Mukherjee while he was in office.

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From Head of DST Media Cell

Covid News Highlights

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New Initiatives

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## DST OVERSEAS



### Neurons in the nose & hypothalamus may be entry points of SARS-CoV-2 virus to brain

Scientists have zeroed in on the route in which the SARS-CoV-2 virus makes its way to

the brain. Neurons located in the nose that help us sense smell as well as hypothalamus, the small region located at the base the brain, could provide the port of entry for the virus into the brain, says a new study.

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### Tracking global genetic variability, predicting viral sequences to resolve COVID 19 challenge

A group of scientists in India is working on genomic sequences of SARS-CoV-2 around the

World, including India, to identify genetic variability and potential molecular targets in virus and human to find the best possible answer to combat the COVID 19 virus.

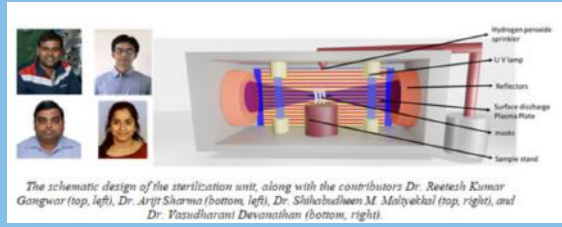
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### Canister bag that solidifies infectious secretions like COVID 19 can save health workers from exposure during handling

Infectious secretions from contagious diseases such as COVID 19, tuberculosis (TB), and influenza poses high risk for healthcare workers. Their exposure to the high-risk hazard while handling the waste can soon be controlled with a canister bag that solidifies the secretions rapidly, making disposal safer.

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The schematic design of the sterilization unit, along with the contributors Dr. Reetesh Kumar Gangwar (top, left), Dr. Arjit Sharma (bottom, left), Dr. Shubhendu M. Malviyikal (top, right), and Dr. Yasudharani Devanathan (bottom, right).

### Portable Sterilization unit using new hybrid sterilization technology can decontaminate PPEs rapidly

Scientists have developed a portable sterilization unit using a new technology called the hybrid sterilization system that can decontaminate personal protective equipment (PPE) necessary for combating COVID 19, easily and rapidly, allowing them to be used multiple times.

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### 49 innovations in 5 focus areas receive Millennium Alliance Round 6 & COVID-19 Innovation Challenge-Awards

The Millennium Alliance Round 6 & COVID 19 Innovation Challenge-Award Ceremony, which recognized 49 innovative solutions in 5 focus sectors of India, highlighted the necessity of building a highly distributed innovation ecosystem.

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### SCTIMST & IIT Madras start-up set up portable hospital infrastructure for COVID 19

The COVID 19 pandemic has highlighted the need to set up systems to improve health infrastructure, particularly in rural areas. Portable hospitals for detecting, screening, identifying, isolating, and treating COVID 19 patients in local communities could soon be a solution to tackle the increasing demands for health infrastructure.

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### Eleven Indo-US scientist teams selected to jointly scout for COVID 19 solutions

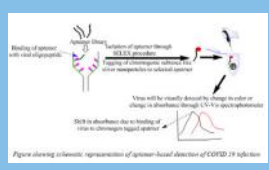
Eleven teams of Indian and US scientists will soon start jointly scouting for out of the box solutions ranging from novel early diagnostic tests, antiviral therapy, drug repurposing, ventilator research, disinfection machines, and sensor-based symptom tracking for COVID 19. The teams have been selected to take up these initiatives through a rigorous binational review process of proposals received for an invitation under COVID 19 Ignition Grants in April 2020 issued by the US-India Science and Technology Endowment Fund (USISTEF).

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### Awards announced for Indo-U.S. Virtual Networks for COVID 19

Eight binational teams consisting of researchers from India and the US have received awards to pursue cutting-edge research in pathogenesis and disease management of COVID 19 through Indo-US virtual networks. The areas of research they will pursue include antiviral coatings, immune modulation, tracking SARS CoV-2 in wastewater, disease detection mechanisms, reverse genetics strategies, and drug repurposing.

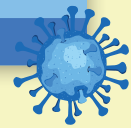
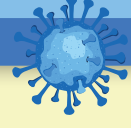
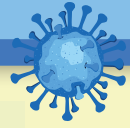
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### Study initiated for low cost COVID 19 detection kit suitable for storage in less stringent conditions in rural areas

The COVID 19 pandemic has thrown up the novel challenge of setting up rapid diagnostic facilities in remote areas which do not have adequate infrastructure. This calls for low cost devices that do not require very stringent storage facilities. Scientists have put in a research plan to meet this urgent requirement.

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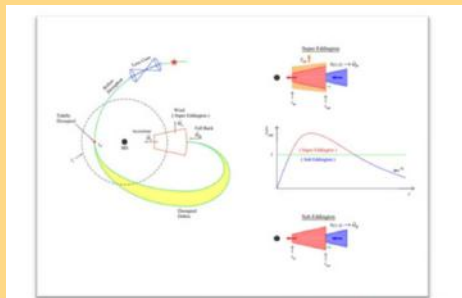
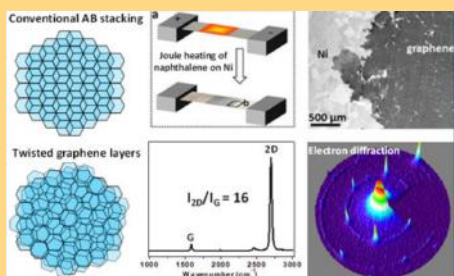


Figure 1: Left: The star with an orbit, in the loss cone in phase space, which takes it inside the tidal sphere. A schematic structure of accretion disk showing the accretion rate, mass fallback rate, and mass inflow rate. Right: The top figure represents the disk structure at different phases. The blue, red, and orange shaded regions show the mass fallback of debris, the disk structure, and the wind structure, respectively. The black arrows represent the inner and outer radii of the disk. The wind is launched from the photospheric height ( $z_p$ ). The right arrow at outer radius implies an evolving outer radius. In the middle plot, the light curve evolves through different phases.

## New model probes how black holes rip apart stars

Scientists have found a new way to probe into supermassive black holes – detecting their properties like mass and spin by observing how they rip apart stars. They have found a model which can infer black hole mass, its spin by observing how the stars are ripped apart on coming to the vicinity of these astronomical bodies with high gravitational force found at the centre of some massive galaxies.

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## New low-cost method upscales & produces twisted multilayer highly conducting graphene

A new low-cost method of upscaling production of graphene while preserving its single layered properties, developed by Indian scientists, may reduce the cost of producing this thinnest, strongest and most conductive material in the world.

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## New information on atmospheric turbulence parameters of Himalaya region can help weather prediction

Preventing the air traffic disasters may now be easier and weather predictions more certain, especially in the Himalaya region. Thanks to certain atmospheric turbulence parameters specific to the Himalaya region that scientists have calculated. Scientists at ARIES, an autonomous institute under the DST, Govt. of India, have estimated turbulence parameters in the lower troposphere over the central Himalayan region for the first time.

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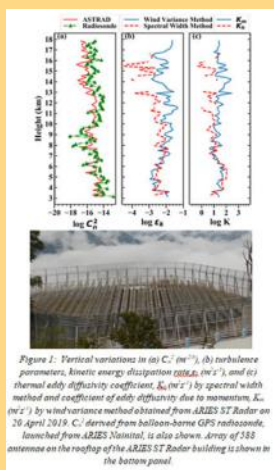


Figure 2: Vertical variations in (a)  $C_2^2$ , (b) turbulence parameters, kinetic energy dissipation rate, and (c) thermal eddy diffusivity coefficient,  $K_0$  ( $m^2/s$ ) by spectral width method and coefficient of eddy diffusivity due to momentum,  $K_1$  ( $m^2/s$ ) by wind variance method obtained from ARIES ST Radar on 26 April 2019.  $C_2^2$  derived from balloon-borne GPS radiosonde, launched from ARIES Nainital, is also shown. Array of 588 antennae on the rooftop of the ARIES ST Radar building is shown in the bottom panel.



## DST's journey of catalyzing innovation, entrepreneurship and incubation report launched

A report on the journey of NSTEDB in catalyzing innovation, entrepreneurship, and incubation was launched by the Secretary Department of Science and Technology, Professor Ashutosh Sharma at an online programme on September 8, 2020.

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## NEW INITIATIVES

- ▶ Call for proposals for BDTD Programme of TDT Division
- ▶ Call for Proposals for Device Development Programme
- ▶ Call for Project Proposals under the Waste Management Technologies Program

▶ Living legend of statistics Prof C R Rao felicitated on his 100th birthday

▶ BHEL to establish high temperature rotor test rig for coal based Thermal Power Plants

▶ Indigenous device for preventing blood clot in deep vein can lower costs of saving life threatening conditions

▶ Krishna-Godavari (KG) basin, an excellent source of fuel methane

▶ Newly discovered interaction between light and molecules can power optical devices

▶ New device can bring down cost of tracking open-heart surgeries

▶ Machine learning solution can make exploring geo-resources simpler

▶ JNCASR researchers develop diagnostic therapy for Lung Cancer

▶ India not part of Climate Change problem but have to be part of solution: DST Secretary

▶ INSPIRE faculty fellow developing low-cost biodiesel from microalgae

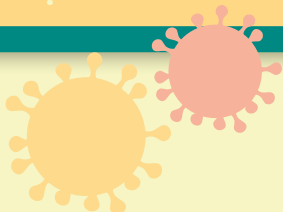
▶ DST encourages translational research on Carbon Capture, Utilisation & Storage

▶ A Tattoo sensor for monitoring vital health parameters

▶ New Insights into Turbulent Drag Reduction (TDR) phenomenon, a mechanism used for saving pumping cost of Crude oil

▶ Bengaluru scientists fabricate invisible shield for electromagnetic interference

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## MEET THE SCIENTIST

### DR VANDANA PRASAD



**Director, Birbal Sahni Institute of Palaeosciences (BSIP)**, is known for her outstanding contributions on the vegetational history and climate change during late Cretaceous-Paleogene and Quaternary period of the Indian subcontinent.

Her study of dinosaur coprolites established the oldest (65Ma) record of grasses in India. She also showed that the rice tribe evolved in India and provided evidence of rain forest vegetation in the southern Western Ghats as Gondwana relics of 55Ma old. Her studies on early Paleogene extreme global warm climate helped understand the vegetation turnover due to long-term effects of elevated CO<sub>2</sub> in tropical ecosystems. Her work on Cretaceous Paleogeography from Deccan Volcanic Province provided new clues for early evolution of Angiosperm.

Dr Prasad has been instrumental in reshaping BSIP to its new mandate with National and International impact. Through sheer grit and devotion, she has been able to address some meaningful and important issues of global significance. She has also developed new proxies of great potential in solving various geological problems which might have long term relevance especially in paleoclimatic research. Since taking over as Director, BSIP, Vandana Prasad brought about several changes resulting in increased scientific output. Very recently, in the wake of the Covid-19 pandemic Dr Prasad spearheaded the transformation of an ancient DNA Lab of BSIP to a biosafety lab for Covid-19 testing with the help of DST, ICMR and the State Government.

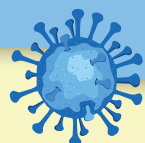
## FEATURED INSTITUTION



### The journey from Palaeobotany to Palaeosciences

Birbal Sahni Institute of Palaeosciences (BSIP), Lucknow that recorded the shortest average time to process samples among institutions in the country, going beyond its mandate to respond to the COVID 19 crisis, works on understanding the past climate, palaeo-biodiversity, palaeo-environment, past civilizations in order to buttress future environmental projections, plans, and preparations for the climate change.

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