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NEWS ALERT

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GLOBAL

Investigational malaria vaccine gives strong, lasting protection
Two U.S. Phase 1 clinical trials of a novel candidate malaria vaccine have found that the regimen conferred unprecedentedly high levels of durable protection when volunteers were later exposed to disease-causing malaria parasites. The vaccine combines live parasites with either of two widely used antimalarial drugs - an approach termed chemoprophylaxis vaccination. A Phase 2 clinical trial of the vaccine is now underway in Mali, a malaria-endemic country. The Sanaria vaccine, called PfSPZ, is composed of sporozoites, the form of the malaria parasite transmitted to people by mosquito bites. In the trials, healthy adult volunteers received PfSPZ along with either pyrimethamine, a drug that kills liver-stage parasites, or chloroquine, which kills blood-stage parasites.

Three months later, under carefully controlled conditions, the volunteers were exposed to either an African malaria parasite strain that was the same as that in the vaccine (homologous challenge) or a variant South American parasite (heterologous challenge) that was more genetically distant from the vaccine strain than hundreds of African parasites. The highest PfSPZ dose with chloroquine gave 100 percent protection for at least three months. These data suggest that the vaccine could be a promising approach for vaccination of travelers to and people living in malaria-endemic areas.

Ultrathin semiconductors electrically connected to superconductors

Researchers at the University of Basel have equipped an atomically thin semiconductor with superconducting contacts. They stacked a monolayer of the semiconductor molybdenum disulfide to form new synthetic materials, known as van der Waals heterostructures for the first time. The researchers found indications of a strong coupling between the semiconductor layer and the superconductor. These ultrathin semiconductors can deliver unique characteristics such as the use of electric fields to influence the magnetic moments of the electrons. With novel electronic and optical properties, these extremely thin materials may have applications in electronics and quantum technology.

Engineered cells successfully treat cardiovascular and pulmonary disease

Scientists at UC San Francisco developed an approach using gene-editing to create ‘universal stem cells’ (named HIP cells) that are not recognized by the immune system and can be used to make universal cell therapeutics. The scientists transplanted specialized, immune-engineered HIP cells into mice to treat three major diseases affecting different organ systems. This immune evasion was maintained in diseased tissue and tissue with poor blood supply without the use of any immunosuppressive drugs. To enhance the translational aspect of this proof-of-concept study, the researchers assessed the treatment’s efficacy using standard parameters for human clinical trials focusing on outcome and organ function. This strategy of immune engineering treatment is cost effective and can be affordable for larger patient populations. Further research would explore the potential of universal stem cells for treating other endocrine and cardiovascular conditions.

Static magnetic field from MRI decreases blood-brain barrier opening volume

Researchers at the Washington University, St. Louis have found for the first time that MRI-guided focused ultrasound combined with microbubbles could open the blood-brain barrier (BBB) and allow therapeutic drugs to reach the diseased brain location under the guidance of MRI. The experiment conducted on mouse models revealed that the expansion, contraction and collapse of the microbubbles, decreased compared to those that had received the dose outside of the magnetic field. The magnetic field of the MRI scanner decreased the BBB opening volume by 3.3-fold to 11.7-fold, depending on the strength of the magnetic field, without any tissue damage from the procedure. The technique can be used for clinical applications of focused ultrasound in brain drug delivery for various brain diseases, such as Alzheimer’s diseases, Parkinson’s disease, ALS, and glioblastoma.

A new approach to fight metastatic melanoma discovered

Researchers from IMIM, Spain discovered a new approach of combining chemotherapy and BRAF oncogene inhibitors as an effective strategy for treating metastatic melanoma. The researchers tested the two treatments both separately and together in mice and in tumour cells in vitro. The combination of the two approaches proved to be superior in all trials after one week of treatment. The therapeutic potential of combining the two treatments demonstrated eradication of cancer cells and the benefits were maintained even after the treatment. The combined treatment eliminates tumour cells rather than stopping their growth, so the treatment duration would be less and also less

possibility of developing resistance. This approach could also be applied to other types of cancer, including some rare sub-types of melanoma that are currently untreatable due to the lack mutations in the BRAF oncogene.

COVID-19

COVID-19 (WORLD)

Milder COVID-19 symptoms from prior run-ins with other coronaviruses

A study by Stanford University School of Medicine investigators shows that people with COVID-19 may experience milder symptoms if certain cells of their immune systems 'remember' previous encounters with seasonal coronaviruses i.e., the ones that cause about a quarter of the common colds. Some portions of SARS-CoV-2's sequence are effectively identical to analogous portions of one or more of the four widespread common-cold-causing coronavirus strains. So, the researchers assembled a panel of 24 different peptide sequences that were either unique to proteins made by SARS-CoV-2 or also found on similar proteins made by one or more (or even all) of the seasonal strains and analyzed blood samples from healthy donors (before the COVID-19 pandemic began). They found that unexposed individuals' killer T cells targeting SARS-CoV-2 peptides that were shared with other coronaviruses were more likely to have proliferated than killer T cells targeting peptides found only on SARS-CoV-2.

Fighting COVID with COVID

Researchers at Penn State have designed a synthetic defective SARS-CoV-2 virus that is innocuous but interferes with the real virus's growth, potentially causing the extinction of both the disease-causing virus and the synthetic virus. The researchers engineered short synthetic defective interfering (DI) virus genome from parts of the wild-type SARS-CoV-2 genome and introduced them into African green monkey cells that were already infected with the wild-type SARS-CoV-2 virus. The team found that within 24 hours of infection, the DI genome reduced the amount of SARS-CoV-2 by approximately half compared to the amount of wild-type virus in control experiments. The experiments could be further repeated in human lung cell lines, and against some of the newer variants of SARS-CoV-2 to verify the potential of SARS-CoV-2 DIs as an antiviral treatment.

Immunity to SARS-CoV-2 is long-lasting

Researchers from Barcelona Institute for Global Health in collaboration with other institutes have concluded that most people with Covid-19 infection maintain anti-Spike antibodies regardless of the severity of their symptoms. The research team conducted a follow-up study of a cohort of healthcare workers with mild to moderate COVID-19 (173 people), although some cases required hospitalization. They found no significant decay in antibody levels over the first five months, and at 9 months, 92.4 percent of peoples remained seropositive – 90 percent of them had IgG, 76 percent had IgA and 61 percent had IgM recognising the Spike protein or the receptor binding domain (RBD). The results were similar among healthcare workers who had not been vaccinated in April (95 percent had IgG, 83 percent IgA and 25 percent IgM). Their research suggests that anti-Spike antibodies protect against symptomatic infections and that the vaccine-induced immunity will also be long-lasting.

Study indicates updating vaccines to combat new variants of concern

The protection offered by two doses of Pfizer BioNTech vaccine for different variants were determined by a team of scientists at University of Tübingen, Germany. They profiled the antibodies generated by vaccination and then examined their neutralizing capacity. In addition to antibodies circulating within the blood, they also checked for the presence of antibodies in saliva as a first line of defense against the virus. They studied samples from vaccinated, naturally-infected and non-infected donors and found that

vaccinated individuals had large amounts of antibodies present in saliva compared to infected individuals. Also, there was no reduction in neutralizing antibodies against the alpha variant. However, there was a substantial reduction in neutralizing antibodies against the beta variant indicating the need to constantly update vaccines to offer maximum protection against different strains of the virus.

CoronaVac vaccine effective at preventing symptomatic COVID-19

To study the safety and efficacy of the CoronaVac vaccine in adults, researchers at the University School of Medicine, Turkey, conducted a double-blind randomized placebo-controlled phase 3 trial of the vaccine in Turkey. They found the vaccine to offer 83.5 percent protection against symptomatic infections after two doses and 100 percent effective against hospitalization. Adverse effects were mainly mild and resolved within a day. Immunological assays were carried out on a subset of the study group and the initial results showed that 89.7 percent of vaccine recipients developed antibodies against the virus's spike protein. CoronaVac – an inactivated virus vaccine has been approved in 22 countries for emergency use.

Blood test can track the evolution of coronavirus infection

Researchers from Spain found that patients with COVID-19, in the acute phase of infection, have significantly reduced plasma levels of the full-length ACE2 protein, which SARS-CoV-2 binds to enter cells, compared to non-infected controls. In addition, the plasma levels of a lower molecular mass (70 kDa) ACE2 fragment, generated as a result of interaction with the virus, are increased. These abnormal levels of ACE2 and truncated ACE2 (70 kDa fragment) return to normal after the patients' recovery. This suggests that both forms of ACE2 present in plasma could be used as a good biomarker of the evolution of coronavirus infection and could be a simple and effective method for monitoring SARS-CoV-2 infection.

CRISPR breakthrough blocks SARS-CoV-2 virus replication in early lab tests

Researchers from Australia have used CRISPR gene-editing technology to successfully block the transmission of the SARS-CoV-2 virus in infected human cells. The team used an enzyme, CRISPR-Cas13b that binds to relevant RNA sequences on the novel coronavirus and degrades the genome it needs to replicate inside human cells.The technique also succeeded in stopping viral replication in samples of “variants of concern” such as Alpha. This approach can be used for developing anti-viral drugs not only for COVID-19 but also against other viruses.

COVID-19 (INDIA)

Portable group-oxygen concentrators developed

A team from Jawaharlal Nehru Centre for Advanced Scientific Research, has designed a robust, mobile group-oxygen concentrator called ‘OxyJani’, based on Pressure Swing Adsorption (PSA) technology. The team replaced lithium zeolites (LiX) which is usually used in oxygen concentrators, with sodium zeolites which does not generate toxic solid waste and can be manufactured in India. The concentrator is modular and capable of delivering a range of solutions, conversion of medical air to medical oxygen, and is an entirely off-grid solution including all modules that can facilitate deployment in rural areas. Moreover, the waste from the 13X zeolite plant can be potentially a good agricultural input material. The device output is in the range of 30-40 litres per minute, which is potentially useful for ICU uses too.

First genome sequencing facility in Northeast

An Indian SARS-CoV-2 Genomics Consortium (INSACOG) Sequencing Facility for

the detection of COVID-19 variants has been inaugurated at the Institute of Bio-resources and Sustainable Development Campus in Imphal. This is one of the first facilities for genome sequencing in the Northeastern states and part of the regional sequencing laboratories approved as part of the consortium of 28 national laboratories to monitor the genomic variations in SARS-CoV-2. This facility would enable testing/monitoring of SARS-COV-2 samples from all the NE states and analysis of these data would help in identifying if the mutation influences transmission, clinical outcomes and severity of the disease in the region.

Abbott launches COVID-19 home test kit

Pharmaceutical company Abbott has launched a COVID-19 antigen home test kit (PanBio) in India for the detection of the SARS-CoV-2 virus in adults and children with or without symptoms at a price of Rs 325 for a single test kit pack. Samples can be tested by using a simple nasal swab. The test gives results in 15 minutes, and needs to be used along with Abbott's NAVICA mobile application. The application offers a process of self-registration, automatic reading of results and reporting as per ICMR guidelines. In alignment with the current ICMR advisory on self-use, the company plans to deliver 7 million test kits by the end of July, to ramp up testing of symptomatic and asymptomatic individuals.

India's Cumulative COVID-19 Vaccination Coverage crosses 390 millions

The cumulative number of COVID-19 vaccine doses administered in the country has reached more than 390 million till 15th of July. The beneficiaries vaccinated include within age group of 18-44 years (118 million have taken the first dose and 4 million have taken the second dose); within age group of 45-59 years (96 million have taken the first dose and 26 million have taken the second dose); beneficiaries more than 60 years (71 million have taken the first dose and 29 million have taken the second dose); health care workers (10 million have taken the first dose and 7 million have taken the second dose) and frontline workers (17 million have taken the first dose and 10 million have taken the second dose).

INDIA – SCIENCE & TECHNOLOGY

Industrial waste can be an efficient catalyst for batteries

Scientists at Centre for Nano and Soft Matter Sciences (CeNS) have demonstrated that the spent catalysts from the energy industry can work as an efficient bifunctional oxygen electrocatalyst and can catalyze both electrochemical oxygen evolution (OER) and oxygen reduction reactions (ORR), the core reactions that facilitate the operation of metal-air batteries. The spent catalyst (carbon nanotubes with Ni nanoparticles and porous alumina) shows stable current density for 20 hrs and 8 hrs towards OER and ORR. The spent catalyst when employed in Zn-air batteries displayed charge-discharge performance up to 45 hrs with high reversibility. This finding opens up a potential use for such waste.

New solar thermal components testing facility at Hyderabad

International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI) has set up a new Concentrated Solar Thermal (CST) based test rig facility at Hyderabad to help the growing solar industry in India and to test capability and performance of solar thermal components like solar receiver tubes, heat transfer fluids, concentrating mirrors. The parabolic-trough test rig facility can conduct heat gain studies in real-field conditions with the actual measurement of solar irradiance levels and has an electrical heater support for measuring the actual heat loss of solar receivers at different operating temperatures. Recently, HPCL R&D, Bangalore, has approved a project at ARCI for validating their indigenously developed heat transfer fluids with the comparison of a world-leading commercial product.

World's first free database of genomic variants of oral cancer developed

DBT-National Institute of Biomedical Genomics (NIBMG), Kalyani has created a database of genomic variations in oral cancer- dbGENVOC which is publicly-accessible. First release of dbGENVOC contains (i) ~24 million somatic and germline variants derived from whole exome sequences of 100 Indian oral cancer patients and whole genome sequences of 5 oral cancer patients from India, (ii) somatic variation data from 220 patient samples drawn from the USA and analyzed by TCGA-HNSCC project and (iii) manually curated variation data of 118 patients from recently published peer-reviewed publications. Variants were identified by the community approved best practice protocol and annotated using multiple analytic pipeline. The repository would be updated annually with variation data from new oral cancer patients from different regions of India and southeast Asia to support oral cancer research. Oral cancer is one of the most common forms of cancer in India. The URL for the database, dbGENVOC, is: http://research.nibmg.ac.in/dbcares/dbgenvoc/

The genome of a salt-secreting mangrove species decoded

Scientists at the DBT-Institute of Life Sciences, Bhubaneswar have reported for the first time a reference-grade whole genome sequence of a salt-tolerant and salt-secreting true-mangrove species, Avicennia marina. The sequence assemblage covered 98.7 percent of the genome of size 462.7 Mb in 31 chromosomes derived from 88 scaffolds and 252 contigs. The study employed the latest genome sequencing and assembling technologies and identi?ed 31,477 protein-coding genes and a "salinome" consisting of 3246 salinity-responsive genes and homologs of 614 experimentally validated salinity tolerance genes. The identified genes would be useful for developing drought and salinity tolerant varieties of important crop species of the coastal regions.

Rare superluminous supernova shining with borrowed energy source spotted

An extremely bright, hydrogen deficient, fast-evolving supernova that shines with the energy borrowed from an exotic type of neutron star with an ultra-powerful magnetic field has been spotted by researchers from Aryabhatta Research Institute of Observational Sciences (ARIES) Nainital. They found that the outer layers of the onion structured Supernovae had been peeled off, and the core was shining with a borrowed energy source, possibly from an exotic type of neutron star with an ultra-powerful magnetic field (magnetar) with a total ejected mass of ~ 3.6-7.2 times the mass of the sun The team observed it using special arrangements at India's recently commissioned Devasthal Optical Telescope (DOT-3.6m) along with two other Indian telescopes: Sampurnanand Telescope-1.04m and Himalayan Chandra Telescope-2.0m.

IIT Madras researchers develop model to detect cancerous mutations

Researchers from Indian Institute of Technology (IIT) Madras, have developed a machine learning model that can use genome sequencing data to detect cancerous mutations in the body. They found that the neighbouring gene sequences of driver mutations are significantly different from that of passengers (benign mutation). The AI based mathematical model - NBDriver, designed by the researchers can identify the pathogenic variants of mutations that can cause cancer based on the genome data around the mutations. The performance of NBDriver was tested on several open-source cancer mutation datasets and found that the model could distinguish between well-studied drivers and passenger mutations from cancer genes with an accuracy of 89 percent. Furthermore, combining the predictions from NBDriver and three others commonly used driver prediction algorithms resulted in an accuracy of 95%, significantly outperforming existing models.

IN BRIEF

New method for synthesizing biodiesel from Jatropha curcas plant

A team from Russia's RUDN University has developed a new method of producing fuel from Jatropha curcas, a poisonous tropical plant using natural minerals and a non-toxic additive from vegetable raw materials. The reaction efficiency is 85 percent. The fuel can be used in diesel internal combustion engines. The researchers mixed the Jatropha oil with three times as much methanol and added a catalyst - minerals from the zeolite group, mainly thomsonite and optimized the reaction by adding furfural. The characteristics of biodiesel from jatropha allow it to be used in internal combustion engines in the future.

A new class of memory cells in the brain discovered

A research team at Rockefeller University has found a class of neurons in the brain that links face perception to long-term memory. They discovered that a small area in the brain's temporal pole (TP) region may be involved in facial recognition. The team used functional magnetic resonance imaging as a guide to study the TP regions of two rhesus monkeys. The team found that the cells of the TP region behave like sensory cells, with reliable and fast responses to visual stimuli, which also act like memory cells and respond only to stimuli that the brain has seen before, reflecting a change in the brain as a result of past encounters. The discovery of these cells establishes a new pathway for the fast recognition of familiar individuals and may also have clinical implications for people suffering from prosopagnosia, or face blindness.

The cultured meat that replaces animals with grass

Researchers at the University of Bath, UK have developed an affordable method that uses grass blades to turn cells into cultured meat. The researchers used grass blades, decellularized them and seeded them with a set of cells derived from a mouse cell line. The introduced cells stick to the scaffold's surface, multiply and form links with neighbouring cells, eventually growing as a cell mass to form new 3D tissue. The adhesion of the animal stem cells to the grass surface was found to be around 35 percent. The next big challenge will be scaling up this process to generate sufficient quantities of both cells and scaffold material in order to produce a significant quantity of muscle tissue. This result may further lead to a meat product based on grass, free from the environmental and animal-welfare concerns.

Synthetic biology circuits can respond within seconds

Researchers at MIT have designed the first synthetic biology circuit that relies exclusively on protein-protein interactions. These circuits can be turned on within seconds, much faster than other synthetic biology circuits. The researchers created a network of 14 proteins from species including yeast, bacteria, plants, and humans. They modified these proteins so they could regulate each other in the network to yield a signal in response to a particular event. Their network is designed as a toggle switch, allowing it to “remember” a specific event such as exposure to a certain chemical. These networks can also be programmed to perform other functions in response to an input. This kind of circuit could be useful for creating environmental sensors or diagnostics that could reveal disease states or imminent events such as a heart attack.

Instant water cleaning method

Scientists from Cardiff University, UK, have developed an instant water disinfection method using a catalyst made from gold and palladium that takes in hydrogen and oxygen to form hydrogen peroxide and produces a number of highly reactive compounds - reactive oxygen species, responsible for the antibacterial and antiviral effect. The catalyst-based method was more effective at killing the bacteria and viruses in a shorter space of time compared to other methods that use hydrogen peroxide and chlorine. This process presents the opportunity to rapidly disinfect water over timescales in which conventional methods are ineffective, whilst also preventing the formation of hazardous compounds and biofilms, which can help bacteria and viruses to thrive.

Breakthrough in tissue engineering as shape memory supports tissue growth

Researchers at the University of Birmingham have developed 3D-printed tissue scaffolds that harmlessly degrade while promoting tissue regeneration following implantation. The researchers produced highly porous scaffolds with shape memory, which showed highly promising tissue-healing performance, including the ability to support cell migration, the ingrowth of tissues, and revascularization. The findings were confirmed in a mouse model that simulated implantation into adipose (fat) tissue. The scaffolds showed several major advantages including sufficient elasticity to conform to irregular spaces, the ability to undergo compression of up to 85 percent before returning to their original geometry, compatibility with tissues, and non-toxic biodegradation. These processes will enable production of self-fitting scaffolds for medical and surgical applications.

Engineering seeds to resist drought

Researchers at MIT have developed an engineered seed coating that protects the seeds from the stress of water shortage while providing extra nutrition. They developed a two-layered coating – an engineered gel-like coating to protect the seeds from drying out, and a second, inner layer of the coating containing preserved microorganisms called rhizobacteria, and some nutrients to help them grow. When exposed to soil and water, the microbes can fix nitrogen into the soil, providing the growing seedling with nutritious fertilizer to help it grow. Initial tests using common beans have shown promising results by a variety of measures, including root mass, stem height, chlorophyll content, and other metrics. However, the team is yet to conduct field tests to cultivate a full crop from seeds with the new coating. The process is simple and inexpensive, and could be widely deployed in arid regions.

Virgin Galactic launches fully crewed flight of VSS Unity

Billionaire Richard Branson and five other crew members briefly launched into space for the first fully crewed spaceflight of Virgin Galactic's SpaceShipTwo spaceplane which was carried into launch position by Virgin Galactic’s carrier plane VMS Eve. The Virgin Galactic’s Unity 22 test flight mission took off from the company’s Spaceport America facility in New Mexico and flew just above the boundary of space, where the four passengers and two pilots experienced about four minutes of weightlessness. The SpaceShipTwo vehicle, named VSS Unity, made a successful, crewed suborbital test flight to 86 kms above Earth’s surface before gliding back down for a smooth runway landing. This marks an important step in private sector space flight.

Singapore opens floating 60-megawatt solar farm

A floating solar farm spanning 45 hectares, has commenced operations over Singapore’s Tengeh Reservoir. Comprising 122,00 solar panels, the renewable energy site boasts a 60 megawatt-peak (MWp) capacity. It will generate enough energy to power five local water treatment plants, and reduce carbon emissions by some 32000 tonnes each year. The facility minimizes impact on water quality, flora, and fauna by measures such as leaving sufficient gaps between solar panels to improve airflow and enable enough sunlight to reach aquatic life. Aerators were further added to maintain oxygen levels in the reservoir. In addition, it used floats made using high-density polyethylene, which was a certified food-grade material that was recyclable, UV-resistant, and corrosion resistant. Drone electroluminescence imaging technology would be deployed to capture signals from the solar panels to identify potential defects. This would ensure timely

replacement of any defective modules. The technology was deployed in partnership with Quantified Energy Labs, Singapore.

RESOURCES AND EVENTS

Facilities at the Indian Institute of Astrophysics open for international astronomers

The Kodaikanal Solar Observatory (KSO) of the Indian Institute of Astrophysics hosts several telescopes and instruments for observations of the Sun. This is a unique facility that has the daily and continued observations of the Sun since 1904. The telescopes installed at KSO are the H-alpha telescope, Twin telescope and Warm telescope and also hosts instruments like Spectrograph, Full- Disk Photoheliograph, Full- disk Spectroheliograph etc. Machine time is allocated, scientific merit, joint projects with scientists of the host institute, joint projects with Indian scientists etc. Researchers/Astronomers interested in detailed analysis of individual events or statistical analysis can seek data by writing to the concerned Scientist. Also, information regarding the observing facilities and other related details like digitized archive of data collected over the past 100 years are available at https://www.iiap.res.in/kodai.htm. The daily images obtained with the facility can be accessed at https://www.iiap.res.in/solar_images/?q=DISPLAY_HOME.

Draft National Space Transportation Policy issued

The draft National Space Transportation Policy 2020 issued by the Department of Space aims to unlock the potential of the space sector in the country with respect to space transportation systems. It seeks to create an environment for Indian entities to develop launch vehicles and launch them from Indian territory within the framework of international treaties and safety regulations, as well as enable the commercial utilization of the launch capacity and space transportation technologies developed by the Department.

World Health Organization Issues Report and Guidelines on Use of AI in Health

The World Health Organization has published a report on Ethics and governance of artificial intelligence for health. The report cautions against overestimating the benefits of AI for health, especially when this occurs at the expense of core investments and strategies required to achieve universal health coverage. It also points out risks, including unethical collection and use of health data; biases encoded in algorithms, and risks of AI to patient safety, cybersecurity, and the environment.The report also emphasizes that AI systems should be carefully designed to reflect the diversity of socio-economic and health-care settings. They should be accompanied by training in digital skills, community engagement and awareness-raising for healthcare workers. Governments, providers, and designers must work together to address ethics and human rights concerns at every stage of an AI technology's design, development, and deployment.

Renewables, Efficiency could limit global warming to 1.5°C

The International Renewable Energy Agency (IRENA) has published a report 'World Energy Transitions Outlook: 1.5°C Pathway', that presents a pathway for limiting global average temperature increase to 1.5°C and bringing carbon dioxide (CO2) emissions to net zero by 2050. The report says that an energy transition grounded in renewable sources and technologies that increases efficiency and conservation is the only way to give us a chance of limiting global warming to 1.5°C by 2050. It emphasizes that international cooperation is an essential piece of the global energy transition and argues for a "holistic global policy framework" that will unite countries in a commitment to "a just transition that leaves no one behind and strengthens the international flow of

finance, capacity and technologies". IRENA's analysis shows that energy transition investment will need to increase to a total of USD 131 trillion between now and 2050, which will also result in a cumulative payback of at least USD 61 trillion by 2050.

First global assessment of the earth's cryosphere

A team of researchers from Lanzhou University, China have conducted the first global assessment of the extent of snow and ice cover on Earth's surface and its response to warming temperatures. The global cryosphere shrank by about 87,000 square kilometers each year between 1979 and 2016 as a result of climate change. The shrinkage primarily occurred in the Northern Hemisphere, with a loss of about 102,000 square kilometers each year. Those losses are offset slightly by growth in the Southern Hemisphere (sea-ice in the Ross Sea around Antarctica), where the cryosphere expanded by about 14,000 square kilometers annually probably due to patterns of wind and ocean currents and the addition of cold melt water from Antarctic ice sheets. The global dataset can now be used to further probe the impact of climate change on the cryosphere, and how these changes impact ecosystems, carbon change and the timing of plant and animal life cycles.

Kaseya ransomware attack disrupts businesses

Kaseya, an IT solutions developer for MSPs and enterprise clients, announced that it had become the victim of a cyber-attack on July 2 against multiple managed service providers (MSP), and their customers. 800 to 1500 small to medium-sized companies may have experienced a ransomware compromise through their MSP. According to reports, 800 Coop supermarket chain stores in Sweden had to temporarily close as they were unable to open their cash registers. Ransomware encrypts the victim's files and drives and demands payment in return for a decryption key. The cyber-attack has been attributed to the REvil/Sodinikibi ransomware group, which has claimed responsibility on its Dark Web leak site, The Federal Bureau of Investigation (FBI) and US Cybersecurity and Infrastructure Security Agency (CISA) are investigating.

Cities launch global campaign on climate change

Cities Race to Resilience, a movement launched on 8 July by cities across the world seeks to mobilize action on climate resilience ahead of COP26. This initiative calls attention to the urgent need to build global climate resilience in a way that prioritizes people and nature, and enables vulnerable communities to thrive in spite of climate shocks and stresses. Under this initiative, mayors and local leaders pledge to integrate climate change adaptation and resilience in all aspects of urban planning, and undertake a community-wide climate risk and vulnerability assessment that specifically addresses vulnerable communities. The commitment also requires cities to take immediate action and report progress annually.

EU launches plans to cut emissions

The EU unveiled a plan to achieve carbon neutrality by 2050, with multiple draft legal texts drawn up by the European Commission.The plan effectively bans the sale of new petrol-driven cars from 2035 and reactivate the EU's Emissions Trading System (ETS), the world's biggest carbon market. The legislation will needto be cleared by the European Parliament and the bloc's member states. The 'Fit for 55' package, seeks to reduce net emissions by 55 percent by 2030. The measures include a 'carbon border adjustment mechanism'. Especially sensitive are measures to impose sustainable and probably more expensive fuels in public-facing sectors such as transport, heating and cooling—as well as construction. The European Commission plans to slash aviation emissions with a measure to tax fuel for intra-European flights.

SCIENCE POLICY AND DIPLOMACY

Construction of the world's largest radio telescope to begin

The construction of the Square Kilometre Array Observatory (SKAO), the proposed largest radio telescope in the world, was announced. Once fully operational by 2029, the SKAO — to be built across South Africa and Australia — will generate astronomical data measuring 700 Petabytes, annually. Headquartered in the United Kingdom, the SKAO will be an array of 197 dishes located in South Africa and 131,072 antennas in western Australia and operate in the 50 MegaHertz-15.3 GigaHertz frequency range. The project would need an estimated amount of 2 billion Euros between 2021 and 2029. Of the 16 participating countries in this consortium, Australia, South Africa, United Kingdom, Italy, the Netherlands, Portugal and China, are presently member countries. India, Germany, France, Canada, Japan, Spain, Switzerland, Sweden and South Korea are observers. National Centre for Radio Astrophysics (NCRA), India has been working for the SKAO for the last six years and will continue its engagement.

BRICS countries agree on STI led Innovation Cooperation

All BRICS countries have agreed to the STI-led BRICS Innovation Cooperation Action Plan (2021-24) proposed by India during 12th Meeting of BRICS S&T Steering Committee. The plan seeks to facilitate sharing of experiences of each other's innovation ecosystem and networking of innovators and entrepreneurs. The BRICS officials agreed on collaboration in ten thematic areas - such as Antimicrobial Resistance (AMR), Precision Medicine, Climate and Pollution Problems, Photonics, Materials Science, Renewable Energy, Ocean and Polar Science, etc. India's new proposal regarding inviting for BRICS partnership in India's Technology Summit got positive support from all countries.

UN releases Draft 1 of the Post-2020 Global Biodiversity Framework

The UN Convention on Biological Diversity (CBD) Secretariat has released the first official draft of a new Global Biodiversity Framework to guide actions worldwide through 2030 to preserve and protect Nature and its essential services to people. The framework includes 21 targets for 2030. These include - (1) at least 30 percent of land and sea areas conserved (2) A 50 percent of greater reduction in the rate of introduction of invasive alien species, and controls or eradication of such species to eliminate or reduce their impacts (3) A $US 200 billion increase in international financial flows from all sources to developing countries. The Framework will undergo further refinement during online negotiations and put before the CBD's next meeting of its 196 parties at COP15, scheduled for Kunming, China October 202.The full Global Biodiversity Framework is available at https://www.cbd.int/doc/c/abb5/591f/2e46096d3f0330b08ce87a45/wg2020-03-03-en.pdf

Canada tightens up security rules for foreign research collaboration

The Canadian government announced a new policy that would require Canadian researchers to start including a security risk-assessment form with certain grant applications involving collaboration with foreign companies. It highlighted as especially sensitive a wide range of emerging technologies including quantum computing, aerospace and artificial intelligence. The government is concerned over foreign espionage targeting Canadian universities. The new policy is in line with a broad western movement to tighten up on university leaks of intellectual property or security information to perceived adversaries. The policy does not name any country as a target, or specify any particular technology. The new system was developed in consultation with Canadian universities – but there are still a lot of unresolved issues.

EU plans for a carbon border tax

The European Commission's 'Fit for 55' legislative package launching this week includes a planned levy on heavy industrial imports, known as the carbon border adjustment mechanism (CBAM). The package will deliver a major expansion of carbon pricing in the EU economy. The CBAM will apply a carbon price equivalent to that faced by EU producers to EU imports in key sectors, like steel, cement, aluminium and chemical fertilizers, ostensibly to avoid the risk of "carbon leakage". The mechanism is projected to generate €9.1bn ($10.8bn) a year by 2030, €2.1bn of which will be collected directly at the borders. These measure will not negatively impact several developing and climate vulnerable countries. The European Parliament has passed a resolution on CBAM calling for part of the revenues to be used to increase the EU's international climate finance contributions in precisely this way.

Call for Papers - Science Diplomacy Review

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