VATIS UPDATE
Biotechnology

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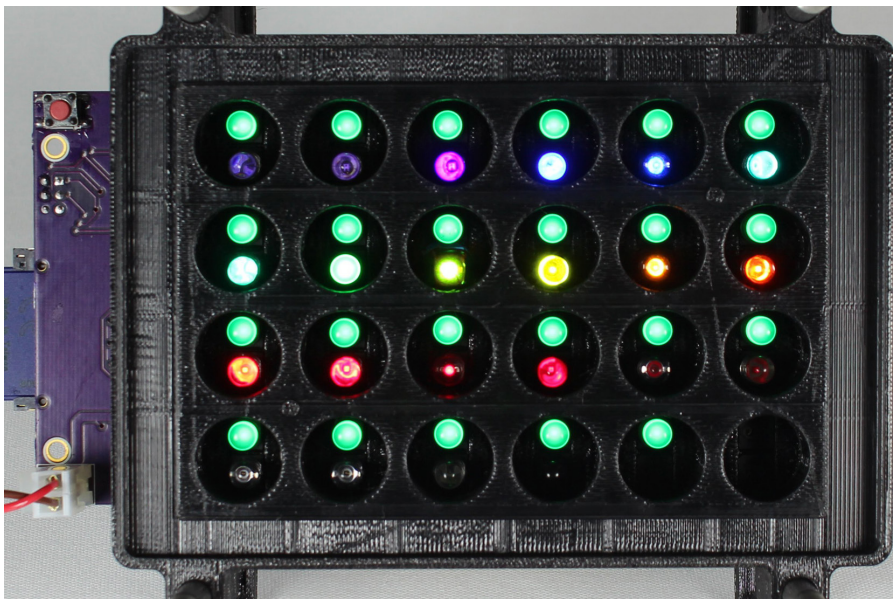
Apprise yourself with the latest technological innovations

Highlights

- Functional gene regulation
- Potential drug therapies
- Malaria vaccine passes first human trial
- Potent molecules to fight TB
- Quantum dots from mango leaves
- New antibiotics from fungi



APCTT
Asian and Pacific Centre for Transfer of Technology

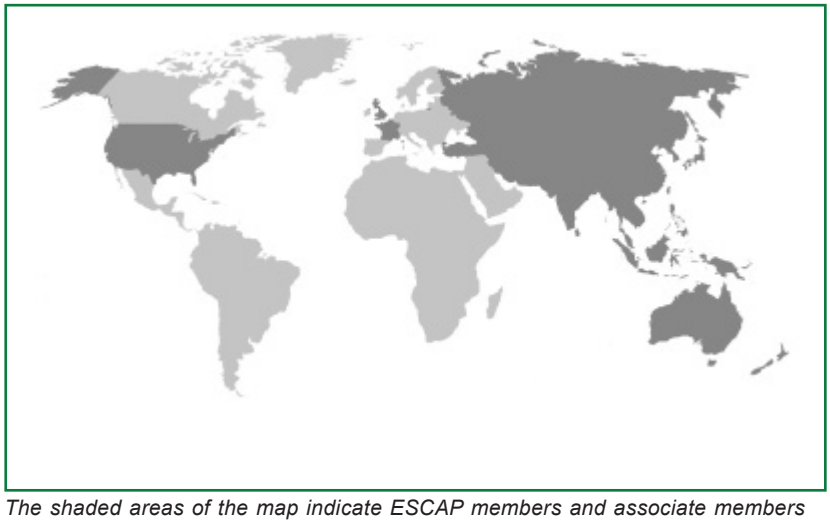
UNITED NATIONS ESCAP
Economic and Social Commission for Asia and the Pacific

BCIL

The **Asian and Pacific Centre for Transfer of Technology (APCTT)**, a subsidiary body of ESCAP, was established on 16 July 1977 with the objectives: to assist the members and associate members of ESCAP through strengthening their capabilities to develop and manage national innovation systems; develop, transfer, adapt and apply technology; improve the terms of transfer of technology; and identify and promote the development and transfer of technologies relevant to the region.

The Centre will achieve the above objectives by undertaking such functions as:

- Research and analysis of trends, conditions and opportunities;
- Advisory services;
- Dissemination of information and good practices;
- Networking and partnership with international organizations and key stakeholders; and
- Training of national personnel, particularly national scientists and policy analysts.



The shaded areas of the map indicate ESCAP members and associate members

Cover Photo

Rice University's new dual-function bioscilloscope uses a Light Plate Apparatus, or LPA, that is outfitted with the spectral LEDs.

(Credit: Karl Gerhardt/Rice University, USA)

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*** Value Added Technology Information Services**

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Global GMO crop area up 3 percent in 2016

According to an annual report released by International Service for the Acquisition of Agri-Biotech Applications (ISAAA), plantings of genetically modified (GMO) crops rebounded in 2016 from a decline the prior year, led by increased sowings in Brazil and the United States. "Biotech crops were planted on a record 185.1 million hectares (457.4 million acres) last year, up 3 percent from the 179.7 hectares (444.0 million acres) planted a year earlier," said ISAAA.

The biotech crops, including corn, soybeans and cotton, are genetically modified to resist pests or disease, tolerate drought or withstand sprayings of weed killers like glyphosate, the active ingredient in Monsanto Co's Roundup herbicide. Other GMO crops include apples that resist browning and potatoes that bruise less. Proponents of biotech crops say the technology lowers the cost of food and helps farmers more safely manage pests and diseases.

However, there has been increasing pressure from some consumers and environmental groups who argue that GMO crops increase pesticide use and pose threats to the environment and human health. GMO seedings expanded 3 percent in the US, the largest producer of biotech crops, and 11 percent in Brazil, the No. 2 market, ISAAA said. The two countries represented 66 percent of total GMO crop seedings globally.

Source: http://www.in.reuters.com

Societal impact of India's biotech sector

In a strategy meet, the Department of Biotechnology (DBT), under the Ministry of Science and Technology, government of India, brought together experts from biotechnology sector to suggest a roadmap to strengthen the department's current programs further with an aim to achieve major social impact by 2022, the 75th anniversary of India's independence and a $100 billion Indian biotechnology sector by 2025.

The DBT officials and other experts along with around 75 experts Directors and scientists from each of the DBT autonomous and associated institutions, discussed the current status of Research & Development, Mission Programs, HRD, Entrepreneurship Development and International Cooperation Programs of the department and ways to accelerate scientific development and reach its benefits to the people.

R&D for cutting edge technologies like genomics and big data analysis, stem cell & regenerative medicine and emerging trends in structural biology and their national reach and progress were highlighted. The department emphasized on a mechanism of rewarding promising projects of societal importance, taking them to translational stage & communicating them and also on skill development specially in the area of management of genetic disorders and genetic counseling.

Source: http://www.dbtindia.nic.in

Efforts to end TB in South-East Asia

Health ministers from countries in WHO South-East Asia Region which bear half the global TB burden, and WHO have signed a Call for Action for Ending TB, pledging to scale-up efforts and implement adequately funded, innovative, multisectoral and comprehensive measures to achieve the global target to end the disease by 2030. In 2015, TB caused nearly 800,000 deaths in the Region while an estimated 4.74 million new cases were reported.

Six of the Region's countries – Bangladesh, Republic of Korea, India, Indonesia, Myanmar and Thailand – are among the 30 high TB burden countries globally. While countries in the region have been making efforts against TB, the annual decline in TB incidence – which is currently between 1.5% and 2% – is insufficient and needs to be scaled up to at least 10-15% for the countries and the region to meet the end TB targets. The global targets seek to reduce TB mortality by 90% and incidence by 80% by 2030.

Committing to take exceptional action and high-impact interventions as per the call for action, the Health ministers agreed to lead the implementation of the national TB response through an empowered body reporting to the highest levels of government. The call for action stresses upon increasing government and partner budgetary allocations to enable national TB plans to be fully funded. The investments in ending TB are expected to give huge returns, with more than 11 million lives expected to be saved across the region by 2035.

Source: http://www.pharmabiz.com

India to research on haemophilia

Aiming to find ways to implement viable, practical and sustainable haemophilia care strategies in the country, the Department of Biotechnology (DBT), under the Ministry of Science and Technology, government of India,

will soon begin research in the area of haemophilia which is an X-linked hereditary single gene bleeding disorder, leading to deficiency of coagulation factor VIII (FVIII) or factor IX (FIX). It manifests as spontaneous or trauma-induced haemorrhagic episodes in patients, progressing to chronic disabilities like arthropathy & contractures and premature mortality in untreated patients or patients with sub-optimal treatment.

Priority areas for research include novel approaches to diagnosis of haemophilia; development of recombinant factors or novel therapies; development of new viral inactivation/removal technologies for plasma products; development of novel approaches to Immune Tolerance Induction therapy (ITI) to treat inhibitors that may develop during CFC replacement treatment of haemophilia; genetic evaluation of the full spectrum of hereditary bleeding disorders which are common in the country to help design a comprehensive cost effective diagnostic strategy; and strategies for development of gene therapy approaches for haemophilia.

Source: http://www.pharmabiz.com

Cooperation for quality medical devices

At 2nd Japan-India Medical Products Regulation Symposium held in Tokyo recently, top government and industry representatives from India and Japan agreed on a joint cooperation for the development of an international standard medical device regulatory ecosystem in India. This partnership, will facilitate and expedite building up of a world class medical device industry in India. As part of the move, Indian medical device industry invited their Japanese counterparts to come and invest in India and support the government initiated 'Make in India' program.

The symposium was hosted by ministry of Health, Labour and Welfare, Government of Japan and Japanese Pharmaceutical and Medical Device Agency with the support of Japan Pharmaceutical Manufacturers Association, Japan Federation of Medical Devices Association, Federation of Pharmaceutical Manufacturers' Associations of JAPAN and Osaka Pharmaceutical Manufacturers Association.

While, the Indian side was represented by officials from ministry of Health, Family and Welfare, Central Drugs Standard Control Organization, members from FICCI, Pharmexcil and Indian medical device industry. The key topics discussed at the cooperative forum included development of medical device regulation, third party medical certifications system, quality standards and GMP system in countries, strategies and challenges for global drug development etc.

Source: http://www.businessworld.in

Biotech startups get government funds in Korea

The Ministry of Science, ICT, and Future Planning, under the Republic of Korea (PRK) government will receive a $100 million fund to help grow startups and venture firms in the biotech industry. This hopefully will help young entrepreneurs launch new startups and develop new biotechnologies. It is now cheaper to fund biotech companies because crucial technologies have become cheaper and lab work has become automated.

Now it is cheap to start a biotech startup in PRK compared to previous years. However, every new startup needs some startup capital. This fund by the Korean government will help with staff, research, development, and production. Also with biotech firms, there is a lot of red tape in regards to permits and licensing. The ministry will look to partner with the Small and Medium Business Administration and the Ministry of Trade, Industry, and Energy.

They hope this fund will bring in more investments and eventually create more jobs. The fund will create a biotech infrastructure that will be the center for research and development. Biotech is considered the next growth engine after IT and the Korean government seems to be fully behind it with their 100 million dollar fund. Hopefully, this is the first step in PRK becoming the leader in regards to biotech and the medical/healthcare global hub.

Source: http://www.seoulspace.co.kr

Programme on clean water technology

India's Department of Biotechnology and Department of Science and Technology, under Ministry of Science and Technology have collaborated with The India-Canada Centre for Innovation Multidisciplinary Partnerships to Accelerate Community Transformation and Sustainability (IC-IMPACTS), to promote multidisciplinary research partnerships. Five projects addressing the issue of Clean Water Technologies will be implemented by the departments at the total cost of Rs. 572 lakhs with matched funding from Canada.

Source: http://www.pib.nic.in

Research for sustainable healthcare technology

The Department of Biotechnology (DBT), India, and the Netherlands Organisation for Scientific Research (NWO)/the Netherlands Organisation for Health Research and Development (ZonMw) will soon jointly begin research on 'Technology for a sustainable healthcare: Minimally invasive techniques'. This programme offers funding opportunities for joint research cooperation between Dutch and Indian research groups.

The aim of this research programme is to stimulate sustainable Indian-Dutch research collaboration by funding joint research projects in the area of medical devices that have the explicit goal to contribute to a more sustainable health care either in both countries. It also aims to develop innovative technology for a sustainable healthcare system. Sustainable healthcare is defined as a high quality system that is affordable and accessible for every individual.

The DBT and the ZonMw have called for proposals from eligible scientists. Thematic focus of this call for proposals are that in general a proposal should meet the WHO-definition for medical devices; contribute to a more sustainable healthcare either in India or The Netherlands as defined in this call; and involve (pre)clinical research with the objective to start phase I/II trial (within the term of the project or directly following the project).

Source: http://www.pharmabiz.com

Sri Lanka to have biotechnology park

The government of Sri Lanka has agreed to establish the Biotechnology Innovation Park in the Nanotechnology Park in Pitipana, Homagama as a public-private partnership project. This year's budget allocated 100 million rupees for the establishment of this facility which will provide facilities mainly for companies engaged in the pharmaceutical industry and genomics.

Apart from the land, the government will also allocate utilities such as electricity and water for the proposed facility. In 2013, Sri Lanka's first ever Nanotechnology and Science Park was commissioned in Homagama with the government investing over 2 billion rupees and six private companies cumulatively investing 310 million rupees.

Source: http://www.lankabusinessonline.com

China eyes booming biotech industry

The Ministry of Science and Technology, government of China, has planned to build 10 to 20 professional biotechnology and medicine zones each with a total output value of 10 billion yuan (about 1.4 billion U.S. dollars) by 2020. "Five to 10 professional biological manufacturing zones will also be established each with the same amount of output value by that time," said Zhang Zhaofeng, in charge of biological and medical technology.

China has ranked second worldwide in the number of published papers and biotechnology patents for five consecutive years, according to the ministry. In 2015 alone, China witnessed the publication of more than 80,000 life science papers and applications for over 20,000 biotechnology patents. More efforts are needed to boost the use of biological big data and protect biological resources, as well as to develop new vaccines and antibodies.

Source: http://www.news.xinhuanet.com

GM crops in the Philippines

Philippines is ranked as the top grower of biotech or genetically modified (GM) crops in Southeast Asia and 12th biggest producer globally last year, the International Service for the Acquisition of Agri-biotech Application (ISAAA) revealed on May 19. ISAAA's chair of the board of Trustees, Dr. Paul Teng, during a media conference on the global status of commercialized GM crops in 2016 in Muntinlupa City, said the country reached a total of 812,000 hectares of biotech or GM corn planted here in 2016, a significant increase of 16 percent from the 702,000 hectares were grown in 2015. Highest hectarage of GM corn recorded is at 831,000 hectares in 2014. Adoption rates of biotech or GM corn here are up by two percentage points to 65 percent in 2016 from 63 percent in 2015. Growing biotech or GM corn has benefitted some 406,000 farmers last year. "Biotech crops have become a vital agricultural resource for farmers because of the immense benefits for improved productivity and profitability, as well as conservation efforts," Teng said.

In a global scale, a total of 185.1 million hectares of biotech or GM crops were planted in 26 countries in Asia, Africa, Europe, and North and Latin America in 2016. GM corn, being the lone biotech crop allowed here, has been planted since 2003 after its approval for commercialization in 2002.

Source: http://www.sunstar.com.ph

Indo-Finnish startup to screen oral cancer

The Department of Biotechnology (DBT), under the Ministry of Science and Technology, government of India, Centre for Cellular and Molecular Platforms (C-Camp), Bengaluru, and Aqsens Health Pvt Ltd, Finland, have collaborated with a team in Finland and local partners in Bengaluru to launch a long-term project to validate and bring to the market saliva-based oral cancer screening method developed by Aqsens.

Stating that this is the first international innovative start-up at C-Camp, a press note issued here read: "The parties have collaborated in this area for a couple of years, and with this announced cooperation they will reinforce their joint commitment on remote health monitoring in India," said C-Camp, adding that the advent of Aqsens on its campus, it has opened its doors to International companies.

Stating that oral cancer is a huge disease burden for India needing interventions for management and prevention, C-Camp said that remote health monitoring is becoming an increasingly important area for national healthcare. Having a cost-efficient and mobile method to screen and monitor diseases like oral cancer will have a significant impact both on the humanity level but also socio-economically, which is what this collaboration aims to achieve.

Source: http://www.timesofindia.indiatimes.com

Virus biosafety laboratory in Korea

Republic of Korea is close to opening its first laboratory fully equipped for experiments with the deadliest of human viruses, such as Ebola. According to the Korea Centers for Disease Control and Prevention (KCDC), the country's first biosafety level 4 (BL-4) lab is ready to open in Osong, in North Chungcheong Province. In the envisioned lab, experiments on about 20 of the most deadly kinds of human viruses, including Ebola and Lassa fever, will be carried out.

Scientists still do not know much about how these diseases spread and have so far failed to develop vaccines. The risk group 4 viruses can kill up to 90 percent of those who contract them and can be passed along by close contact with bodily fluids, perhaps even by a sneeze. According to KCDC, only a handful of doctorate-level scientists, who are trained at BL-4 laboratories in other countries, will have access to the lab to conduct tests.

Cocooned within a submarine-like airtight facility, each room inside the laboratory is equipped with state-of-the art air and sound pressure infrastructure to prevent the spread of virus. Currently, Republic of Korea only operates BL-3 labs that handle pathogens in risk group 3, which usually cause serious human or animal disease but do not easily spread by casual contact.

Source: http://www.koreaherald.com

Pilot test of GSK malaria vaccine

According to the World Health Organization (WHO), Ghana, Kenya and Malawi will pilot the world's first malaria vaccine from 2018, offering it for babies and children in high-risk areas as part of real-life trials. The injectable vaccine, called RTS,S or Mosquirix, was developed by GlaxoSmithKline, the United Kingdom, to protect children from the most deadly form of malaria in Africa.

In clinical trials it proved only partially effective, and it needs to be given in a four-dose schedule, but is the first regulator-approved vaccine against the mosquito-borne disease. The WHO, which is in the process of assessing whether to add the shot to core package of WHO-recommended measures for malaria prevention, has said it first wants to see the results of on-the-ground testing in a pilot programme.

The WHO pilot programme will assess whether the Mosquirix's protective effect in children aged 5 to 17 months can be replicated in real-life. It will also assess the feasibility of delivering the four doses needed, and explore the vaccine's potential role in reducing the number of children killed by the disease. Malawi, Kenya and Ghana were chosen for the pilot due to several factors, including having high rates of malaria as well as good malaria programmes, wide use of bed-nets, and well-functioning immunisation programmes.

Source: http://www.thehindu.com

New immuno-oncology product in India

Biotechnology company, APAC Biotech, India, has been granted a commercial license by Indian FDA – Central Drugs Standard Control Organization (CDSCO) to market their product, APCEDEN®, a Dendritic cell-based autologous Immuno-oncology product for four cancer indication namely Prostate, Ovarian, Colo-rectal and Non Small Cell Lung carcinoma.

CDSCO issued the commercial license (Form 46) to conduct a post marketing surveillance on statistically significant number of patients for each indication. APCEDEN,

an autologous monocyte-derived mature Dendritic cell when loaded with tumor antigen have the ability to generate an effective immune response against the tumor.

In the year 2011, an ATTEST trial was conducted where refractory solid tumor with multiple chemo failure patients were enrolled and administered with APCEDEN. The trial was designed to understand the potential benefits and risk of the therapy. In the trial 28.9% of cases showed stability of disease with good quality of life.

Source: http://www.business.medicaldialogues.in

Funding for life science startups

Centre for Cellular and Molecular Platforms (C-CAMP), an initiative of Dept of Biotechnology, Ministry of Science and Technology, Govt. of India, has launched a fund, in partnership with the Indian government's Biotechnology Industry Research Assistance Council (BIRAC). The scheme – Sustainable Entrepreneurship and Enterprise Development (SEED) – will support 8-10 life sciences startups for its first batch with funding of anywhere between Rs. 5 to 30 lakhs.

It is aimed at providing capital assistance to startups with novel, innovative and disruptive technologies in all sectors of life sciences, including healthcare, medtech, agriculture, bio-energy, industrial products and processes, and nutraceuticals. The fund will enable these startups to graduate to a level where they will be able to raise private investments from angel investors and venture capitalist.

C-CAMP was established with the aim of enabling cutting-edge bioscience research and entrepreneurship. C-CAMP had also recently started a four month accelerator programme for life sciences start-ups that would focus on productisation, market validity, go-to market strategy and business model.

Source: http://www.economictimes.indiatimes.com

New vaccine for diarrhea to be developed

Hilleman Laboratories, India, a non-profit joint venture of pharmaceutical major Merck, Sharp & Dohme, the United States, and Wellcome Trust, the United Kingdom, signed a Memorandum of Understanding (MoU) with National Institute of Cholera and Enteric Diseases (NICED), a part of Indian Council of Medical Research's (ICMR), to develop a new vaccine for diarrhoea caused by Shigella bacteria.

"Hilleman Labs will take the lead in further development of the vaccine candidate for which NICED has already conducted initial research and also be responsible for its regulatory filings and commercialization," said Davinder Gill, at Hilleman Labs. NICED will provide support in the research studies.

Shigellosis is one of the leading causes of death among children under five years of age, especially in low-income developing countries of Africa and South Asia. Hilleman Labs is also developing four other vaccines for diarrhoeal diseases. Its rotavirus vaccine is in phase-II clinical trials and the company is in discussions with various companies for potential out-licensing or partnerships.

Source: http://www.livemint.com

New tests to detect cancer

Strand Life Sciences, India, has begun offering a test called 'STRAND LB' that claims to be able to detect traces of a tumour "from a simple blood draw". Another company MedGenome, India, has also announced the launch of "ONCOTRACK", another 'liquid biopsy' test. "Management of cancer will undergo a massive transformation in India with NGS (next-generation sequencing)-based liquid biopsies… ONCOTRACK is one such offering," said Sam Santhosh, at MedGenome.

NGS refers to techniques to scan genes and look for mutations that may cause cancer. "STRAND LB can detect tumour DNA traces in as many as 35% of patients with early-stage cancer, going up to 70-90% in patients with locally advanced or metastatic cancer. These figures are on a par with the best in the world," said Dr. Vijay Chandru, at Strand Life Sciences. These numbers spanned a wide variety of cancer types, including lung, colorectal, breast, and bladder cancer.

According to Dr. Chandru, liquid biopsy tests couldn't yet be a replacement for traditional biopsies but there were a variety of situations that made them useful – for instance, lung cancer patients who couldn't afford to part with enough tissue. These are important to determine if their tumours carry mutations in genes such as EGFR, making them eligible for specific treatments. It can also be used to monitor the very same patients for the emergence of resistance to these treatments.

Source: http://www.thehindu.com

2G smart bio-refinery

Global process solutions company, Praj Industries, India, has commenced its first integrated

second generation technology (2G) smart bio-refinery to produce ethanol from agri-waste. The 2G demo plant produces ethanol by processing a variety of agri-residue like rice and wheat straw, cotton stalk, bagasse, cane trash, corn cobs and stover, into ethanol, with superior product yields.

"With continual research and development, further pipeline of other renewable fuels and chemicals is underway to be produced from this technology platform. This innovative technology has substantial potential to enhance energy security and help India become energy self-reliant. The commercialisation of the 2G ethanol technology will give an impetus to rural economy and create additional employment opportunities," said Pramod Chaudhari, at Praj Industries.

Source: http://www.indiatoday.intoday.in

Serum Institute buys US biotech firm

Serum Institute of India has acquired Nanotherapeutics, the United States, which makes injectable polio doses for €72 million. The acquisition would catapult the Pune-based company to the largest injectable polio vaccine maker in the world with over 200 million doses. The plant at Bohumil, which is one hour off the Czech Republic capital Prague, is not functional now and Serum Institute will have to invest an additional €30-40 million euros to make it functional.

Serum Institute is the world's largest vaccine manufacturer by number of doses produced and sold globally. "This acquisition will add to our injectable polio capacity by four times to a total of 200 million doses by 2019, making us the largest injectable (not oral) polio vaccine manufacturer in the world," said Adar C Poonawalla, at Serum Institute. The current acquisition by the company is the second one overseas since 2012 when it bought a plant in Holland.

Source: http://www.thehindubusinessline.com

GM crop ready for release in Bangladesh

Three years after the release of Bt Brinjal, Bangladesh is going to get its second genetically modified (GM) crop -- a disease resistant potato -- as scientists have sought government approval for its commercial use. Bangladesh Agricultural Research Institute, which has developed the blight resistant (RB) potato, applied on December 29 for the commercial release of the crop, Bari Director General Md Rafiqul Islam Mondal told The Daily Star. Once released, RB potato will be farmers' answer to late blight, one of the most devastating plant diseases caused by fungal attack. Farmers in Bangladesh spend up to Tk 100 crore a year in spraying 500 tonnes of fungicide to protect this major tuber crop from late blight.

With an annual output of nine million tonnes, Bangladesh is a potato exporting nation ranking 7th among the top potato-producing countries in the world. Apart from Bangladesh, India, Indonesia and Uganda are also working on developing and releasing blight resistant GM potato. According to the International Potato Center (CIP), potato is the third most important food crop in the world after rice and wheat in terms of human consumption. More than a billion people eat potato, and its worldwide production exceeds 300 million metric tonnes.

Breeders involved in developing the RB potato since 2006 at Bari said the resistant gene was taken from wild potato varieties and was infused into a potato variety called Katahdin in the United States. They said it was crossed with Diamant and Cardinal -- two popular potato varieties in Bangladesh. After years of lab tests, greenhouse and contained field trials across the country, Bari scientists found out that RB potato succeeded in resisting the late blight. Later, they approached the Ministry of Agriculture for regulatory approval, said Md Jahangir Hossain, director of Bari's Tuber Crops Research Centre (TCRC).

Bari developed the late blight resistant potato in cooperation with the Agricultural Biotechnology Support Project II (ABSPII), a USAID-funded consortium of public and private sector institutions supporting scientists, regulators, extension workers, farmers and the general public in developing countries to make informed decisions about agricultural biotechnology.

Source: http://www.thedailystar.net

China's biotech sector

China's Ministry of Science and Technology issued a special plan for biotechnology innovation in the 13th Five-Year Plan which says that China's biotech sector will exceed four percent of GDP by 2020, Xinhua reported on April 28. According to the plan, China is to make some major achievements in biotechnology by 2020, which will promote its development in fields including medicine, agriculture, resources, and environmental protection.

Source: http://www.chinadaily.com.cn

Genetics of smell

Researchers from the Wellcome Trust Sanger Institute (WTSI), the United Kingdom, and their collaborators have shown that receptors in the noses of mice exposed to certain smells during life are different to genetically similar mice that lived without those smells. This combination of genetics and experience gives each individual a unique sense of smell. To investigate the sense of smell the researchers used laboratory mice as a model, comparing the olfactory neurons from genetically identical animals that grew up in different environments.

They also compared animals that grew up in the same environment but were genetically different. The team used RNA sequencing to see which receptor genes were active. The researchers found that genetics controlled which receptors were present in the mice. Crucially however, they found that the environment that the individual had lived in had a significant effect on the number of cells able to identify each smell.

Olfactory neurons are formed throughout an individual's lifetime, and the study showed the olfactory system adapted to the environment, leading to more cells capable of detecting scents to which there has been greater exposure. As a consequence, different individuals, even if genetically similar, may have completely different olfactory abilities. This could contribute to the individuality of the sense of smell, even in humans.

Source: https://www.eurekalert.org

Functional gene regulation

A team of researchers from Duke University, the United States, have developed a high-throughput screening technique that uses CRISPR-Cas9 epigenome editing to identify regulatory elements in the genomes of human cells. The researchers created lentiviral libraries of guide RNAs to target likely regulatory elements across several megabases of DNA surrounding two loci of interest: β-globin and HER2.

They then generated cell lines with an integrated fluorescent protein to report on target gene activation. The authors transduced their cell lines with one of two versions of the Cas9 protein with deactivated nuclease activity, dubbed dCas9. The repressor form of dCas9 recruits proteins that methylate lysine 9 on histone H3, leading to heterochromatin formation and gene repression in target sequences.

The activator form of dCas9 binds to targeted DNA enhancers or promoters and facilitates the acetylation of lysine 27 on histone H3, which results in gene activation. Next, the researchers transduced their cell lines with the libraries of guide RNAs at low levels to ensure that a single guide RNA would be present in each cell. They then sorted the cells based on fluorescence, and sequenced the guide RNA present in cells with especially high and low target gene expression.

Source: http://www.the-scientist.com

Plant hormone function

An international team led by Salim Al-Babili at King Abdullah University of Science and Technology (KAUST), Saudi Arabia, and Matias Zurbriggen from the University of Dusseldorf (HHU), Germany, has developed a strigolactone sensor that can be genetically encoded into plant cells to help our understanding of plant development. According to Al-Babili, "Strigolactones are unstable and occur at very low concentrations, which make these hormones difficult to study."

Strigolactones are sensed in plant cells when they bind to a receptor protein known as D14, forming a complex. This binding recruits another protein to the complex, SMXL, which is then degraded, activating downstream responses. The team harnessed this degradation process to develop their innovative sensor. The new strigolactone sensor – which is genetically encoded so that it can be produced within living cells – comprises a version of SMXL coupled to a yellow luminescent enzyme, luciferase, derived from fireflies.

When SMXL degrades, the luciferase is also degraded, resulting in reduced yellow luminescence. To enable quantification of the effect of strigolactones, the sensor also incorporates a green luciferase derived from the sea pansy, an animal related to jellyfish and corals. The green luciferase is produced in the same quantities as SMXL but is not directly attached to it and is therefore not degraded when strigolactones are present. The ratio of the two colors of luminescence gives a very precise measure of the level of strigolactone activity.

Source: https://www.discovery.kaust.edu.sa

Bacteria-seeking pill could replace antibiotics

A group of US researchers from University of Wisconsin-Madison, the United States, has proposed a cutting edge alternative for

eliminating resilient bacteria in the form of a "CRISPR pill". The drug can specifically target harmful bugs using a combination of bacteria-seeking viruses and a cocktail of probiotics, making it more potent than most antibiotics. The study was funded by the National Institute of Health (NIH).

The edible "CRISPR pill" is intended to seek and destroy targeted bacteria within our body with scalpel-like precision. It combines specific bacteria-infecting viruses (bacteriophages) that carry genetic self-destruct instructions and a mix of probiotic "good bacteria". These bacteria fighting duo is designed to effectively eliminate specific harmful strains of bugs, making it a highly promising candidate for treating antibiotic-resistant microbes.

The novel drug is currently directed to fight *Clostridium difficile*, a common pathogen known to cause fatal infections if it develops antibiotic resistance. It has been classified as a top drug-resistant threat by the Centers for Disease Control and Prevention (CDC) and is estimated to account for 15.000 deaths and $ 1 trillion in medical expenses annually in the US alone.

Source: http://www.splice-bio.com

Diagnosis and treatment of diabetes

An international team of researchers from University of London, the United Kingdom, Ulm University Medical Center, Germany and the Lee Kong Chian School of Medicine, a joint medical school of Imperial College London and Nanyang Technological University (NTU), Singapore, investigating a form of adult-onset diabetes that shares features with the two better-known types of diabetes have discovered genetic influences that may offer clues to more accurate diagnosis and treatment.

Latent autoimmune diabetes in adults (LADA) is informally called "type 1.5 diabetes" because like type 1 diabetes (T1D), LADA is marked by circulating autoantibodies, an indicator that an overactive immune system is damaging the body's insulin-producing beta cells. But LADA also shares clinical features with type 2 diabetes (T2D), which tends to appear in adulthood. Also, as in T2D, LADA patients do not require insulin treatments when first diagnosed. The study uses genetic analysis to show that LADA is closer to T1D than to T2D.

The study team compared DNA from 978 LADA patients, all adults from the U.K. and Germany, to a control group of 1,057 children without diabetes. Another set of control samples came from 2,820 healthy adults in the U.K. All samples were from individuals of European ancestry. The researchers calculated genetic risk scores to measure whether LADA patients had genetic profiles more similar to those of T1D or T2D patients. They found several T1D genetic regions associated with LADA, while relatively few T2D gene regions added to the risk of LADA.

Source: http://www.news-medical.net

Gene editing strategy

In new research, scientists at the Lewis Katz School of Medicine at Temple University (LKSOM), the United States, and the University of Pittsburgh, the United States, showed that they can excise HIV DNA from the genomes of living animals to eliminate further infection. They are the first to perform the feat in three different animal models, including a "humanized" model in which mice were transplanted with human immune cells and infected with the virus.

The team is the first to demonstrate that HIV-1 replication can be completely shut down and the virus eliminated from infected cells in animals with a powerful gene editing technology known as CRISPR/Cas9. The new work builds on a previous proof-of-concept study, in which the researchers used transgenic rat and mouse models with HIV-1 DNA incorporated into the genome of every tissue of the animals' bodies.

They demonstrated that their strategy could delete the targeted fragments of HIV-1 from the genome in most tissues in the experimental animals. The team genetically inactivated HIV-1 in transgenic mice, reducing the RNA expression of viral genes by roughly 60 to 95 percent. They then tested their system in mice acutely infected with EcoHIV, the mouse equivalent of human HIV-1.

Source: https://www.medicine.temple.edu

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Potential drug therapies

Researchers at Washington University School of Medicine (WUSM), the United States, The Broad Institute of MIT and Harvard, the United States, and Baylor College of Medicine (BCM), the United States, recently studied mice with breast tumors transplanted from patients and analyzed the proteins present in these tumors. The researchers demonstrated that some protein alterations can be used to identify drugs that may work against some cancers.

The work is part of the National Cancer Institute's (NCI) Clinical Proteomic Tumor Analysis Consortium efforts. The researchers studied 24 tumor samples from breast cancer patients after the samples were transplanted into mice. Twenty-two of the transplanted samples retained their genetic and proteomic identities as specific types of breast cancer. A proteomic analysis of the tumors also identified multiple protein targets that have the potential to respond to drugs.

For example, the researchers showed dialed-up activity of multiple protein pathways that could be targeted with investigational drugs called PI3K inhibitors and mTOR inhibitors, separately and in combination, depending on the tumor. They also showed that drugs against a type of breast tumor called HER2 positive breast cancer – such as the dual ERBB2/EGFR inhibitor lapatinib – potentially could benefit more patients than currently receive them, if analysis of the tumor proteins is taken into consideration.

Source: https://www.medicine.wustl.edu

Proteomics helps identify genetic variations

The team researchers from Helmholtz Zentrum München, Germany, and the Technical University of Munich (EKFZ), Germany, has successfully used highly sensitive mass spectrometric methods to identify previously unknown proteins and protein complexes, whose binding to DNA is influenced by SNPs. "Here we could close the gaps that exist today between genetic variations and an understanding of their functional effect on the organism," said Dr. Stefanie Hauck, at the Helmholtz Zentrum München.

"Concretely, we apply these methods to SNPs that are relevant to type 2 diabetes and to age-related macular degeneration (AMD). In the future, the method will make it possible to identify functionally relevant proteins for all disease-associated SNPs, in order to uncover the mechanisms behind a clinical picture," said Hauck. An exact understanding of the molecular mechanisms that are modulated by regulatory SNPs can contribute to further development of personalized medicine.

Source: https://www.tum.de

Discovery of a new regulatory protein

Bioengineers at the University of California San Diego, the United States, have discovered a protein that regulates the switch of embryonic stem cells from the least developed "naïve" state to the more developed "primed" state. This discovery sheds light on stem cell development at a molecular level. "This discovery provides a fine-tuning knob for the stem cell engineering toolkit," said Sheng Zhong, at the UC San Diego.

The researchers discovered that the protein, called SMARCAD1, interacts with a specific type of histone modification, called histone citrullination (H3R26Cit), to prevent the spontaneous switch from the naïve to the primed pluripotent state. By suppressing SMARCAD1 from interacting with H3R26Cit, researchers were able to induce this switch. They also found that the stem cells with suppressed SMARCAD1 expression remained pluripotent.

Researchers first used protein arrays composed of hundreds of histone peptides harboring distinct post-transcriptional modifications, and found that SMARCAD1 specifically interacts with the H3R26Cit modification. They then used a technology called ChIP-seq to assay genome-wide distributions of SMARCAD1 binding as well different kinds of histone modifications, and found that SMARCAD1 specifically binds to H3R26Cit modified histones in the entire genome.

Source: http://www.jacobsschool.ucsd.edu

Relocation of proteins with a nanobody tool

Researchers at the Biozentrum of the University of Basel, Switzerland, have developed a new method by which proteins can be transported to a new location in a cell. The novel tool enables scientists to study the function of proteins depending on their position by using nanobodies. The tool can be used for a wide range of proteins and in various areas of developmental biology. The results have been

published in the scientific journal *eLife*.

The research group of Markus Affolter is investigating the growth of the wings of the fruit fly Drosophila to understand which processes control organ development and growth. Proteins that control such growth processes are the focus of their investigations. In this context, not only the composition of the proteins is important, but also their position which can influence protein function. The new nanobody tool allows the relocation of proteins and thus to study their function in a position-dependent manner.

A repositioning of the proteins of interest requires a labeling with the green fluorescent protein (GFP). Subsequently, so-called anti-GFP nanobodies, small antibody fragments derived from camels, are then used to bind and to move the GFP-tagged proteins to a new site in the living organism. The nanobody itself is linked to a signal protein that defines the destination of the target protein. Thus, the nanobody forces the GFP-tagged protein into a new position. The researchers were able to transfer proteins to a new site, internal or external to the cell.

Source: https://www.unibas.ch

Protein that enhances vaccine efficacy

Researchers from Boston University School of Medicine (BUSM), the United States, have discovered a protein that could help make vaccinations more effective and also provide protection from other diseases such as cancer. The researchers purified a protein found on the exterior of bacteria (*Neisseria meningidis*) and used it as an accessory to provide a better vaccination response.

The study may lead to greater understanding of how vaccine enhancers work and can best be used. "This study has wide implications as it could not only be used to help the body identify and fight off bacterial infections, but it could also potentially help the body use its own machinery to fight off other diseases like cancer, HIV, and influenza before they have a chance to establish within the body," said Lee Wetzler, at BUSM.

In this study, the researchers used two experimental models. The first model was given a vaccination with antigen and mixed PorB, while the second model was given the antigen alone.

The model that received the PorB had an increase in the response to the vaccine antigen, evidenced by an increased number of activated cells in the lymph nodes and a gain in the production of cytotoxic T cells, as compared to the vaccination with the antigen alone.

Source: http://www.business-standard.com

New appetite-regulating hormone

Researchers at Hiroshima University, Japan, have discovered a molecule that can increase appetite during fasting and decrease it during gorging. Their findings suggest that the protein named NPGL is involved in maintaining body mass at a constant, regardless of food intake. In recent decades, our understanding of hunger has greatly increased, but this new discovery turns things on their head.

Up until now, scientists knew that leptin – a hormone released by fatty tissue – reduces appetite, while ghrelin – a hormone released by stomach tissue – makes us want to eat more. These hormones, in turn, activate a host of neurons in the brain's hypothalamus, the body's energy control center. The discovery of NPGL by Professor Kazuyoshi Ukena shows that hunger and energy consumption mechanisms are even more complex than realized earlier.

Ukena first discovered NPGL in chickens after noticing that growing birds grew larger irrespective of diet, suggesting there was more to energy metabolism than meets the eye. Intrigued, the researchers performed a DNA database search to see if mammals might also possess this elusive substance. They found that it exists in all vertebrates – including humans. In order to investigate its role, if any, in mammals, researchers fed three groups of mice with three distinct diets to see how NPGL levels are altered.

Source: https://www.asianscientist.com

Biosafety Clearing-House

The Biosafety Clearing-House has been established under the Cartagena Protocol on Biosafety to: facilitate the exchange of scientific, technical, environmental and legal information on living modified organisms; and assist Parties to implement the Protocol.

For more information, access:

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Scientists step closer to new HIV vaccine

Scientists from All India Institute of Medical Sciences (AIIMS), New Delhi, in collaboration with Indian Institute of Science (IIS), Bangalore, Translational Health Science and Technology Institute (THSTI), Faridabad, Y. R. Gaitonde Centre for AIDS Research and Education (YRGCARE), Chennai, National Brain Research Centre (NBRC), Manesar, and International AIDS Vaccine initiative (IAVI), have identified a new antibody against HIV subtype-C from Indian patients.

This finding will help design vaccines against HIV in the future. When given along with retroviral drugs, such a vaccine will be able to reduce viral load in patients. This will also help in passive immunotherapy – killing low amounts of virus in patients who may have been accidently infected with the virus. The antibody identified by Indian scientists has been named C11 since it is specific to subtype-C of HIV virus. Blood samples were taken from a set of patients visiting AIIMS and YRGCARE, for treatment.

These samples were used to make a library of all virus-specific DNA sequences in the patient body. Some of these DNA sequences were the used to make proteins that could bind to HIV virus. These proteins were small antibody fragments that could bind to HIV virus with high efficiency. It was found that smaller fragments of antibodies could bind to HIV proteins more effectively than full antibodies because they could reach to deeper areas in the cells for binding. These proteins can also be used for targeted drug delivery to HIV infected cells in the future.

Source: http://www.vigyanprasar.gov.in

Malaria vaccine passes first human trial

A new malaria vaccine developed by scientists at Griffith University, Australia, has passed its first test in early human trials. The vaccine, called PlasProtecT, consists of inactivated human malaria parasites which have been prevented from growing and causing a malaria infection. The vaccine works by stimulating a natural immune response which can protect a person for years against the mosquito-borne disease.

Lead researcher Michael Good, at Griffith's Institute for Glycomics, was the first person to be immunised. "I wouldn't ask people to do what I wouldn't be prepared to do, and we couldn't do this without the volunteers who give their time to us knowing they are helping further work towards a cure," said Good. It was later tested on another 11 people and proven to be safe and effective.

"This is a world first. We are the first to put a vaccine like this into humans that has potential to protect against multiple strains and species of malaria," said Gold Coast Health Director of Infectious Diseases. PlasProtecT represents a huge step forward in the fight against malaria. The trials have shown that this human immune response also recognises other strains and even other species of the parasite.

Source: http://www.theaustralian.com.au

3D-printed human cartilage cells

A team of scientists from Sahlgrenska Academy, Sweden, and Chalmers University of Technology, Sweden, have managed to successfully implant human cartilage cells in six-week-old baby mice. The researchers created a gel composed of human cartilage cells, printed it through aCELLINK 3D bioprinter and implanted the material inside the lab mice.

Once implanted, the tissue began to grow and proliferate inside the animal, eventually vascularizing, with blood vessels growing inside the implanted material. After two months, the material began to more closely resemble human cartilage, which was further stimulated with the addition of stem cells.

The team worked with local plastic surgeons to implant the material, which could one day be used to create more natural implants for patients who have lost ears, noses or knees due to accidents or diseases like cancer. The process is still a ways from becoming a viable reality, but it's a promising step in the process, which could someday extend beyond cartilage to other key human tissue.

Source: https://www.techcrunch.com

Potent molecules to fight TB

Scientists at the Indian Institute of Science (IISc) Bengaluru have developed two new, potent molecules that can severely impact the survival of mycobacteria, including *Mycobacterium tuberculosis* that causes TB. The master regulator of stress pathway in the case of mycobacteria is (p)ppGpp

(Guanosine pentaphospahte or Guanosine tetraphosphate). Though a molecule that inhibits the (p)ppGpp formation has already been synthesised, the efficacy is not much.

"Very high concentration of Relacin molecule is needed to inhibit the pathway and, therefore, the efficacy is low. So we synthesised two new molecules – acetylated compound (AC compound) and acetylated benzoylated compound (AB compound) – by bringing about a modification in the base of the Relacin molecule," says Prof. Dipankar Chatterji, at IISc. Laboratory studies showed that the two molecules were not toxic to human cells and were able to penetrate the human lung epithelial cells.

Source: http://www.thehindu.com

Blood test for treating depression

According to a research led by Dr. Madhukar Trivedi, at UT Southwestern Medical Center's Center for Depression Research and Clinical Care (CDRC), the United States, a blood test that measures a certain type of protein level provides an immediate tool for physicians who until now have relied heavily on patient questionnaires to choose a treatment. The study demonstrated that measuring a patient's C-reactive protein (CRP) levels through a simple finger-prick blood test can help doctors prescribe a medication that is more likely to work.

Utilizing this test in clinical visits could lead to a significant boost in the success rate of depressed patients who commonly struggle to find effective treatments. A major national study Dr. Trivedi led more than a decade ago (STAR*D) gives insight into the prevalence of the problem: Up to a third of depressed patients don't improve during their first medication, and about 40 percent of people who start taking antidepressants stop taking them within three months.

Source: https://www.sciencedaily.com

Novel target for blocking cancer metastasis

Researchers from Indian Institute of Technology (IIT) Bombay, India, have found a novel pathway that is responsible for the progress of cancer metastasis – spread of cancer cells from its primary site of origin to new areas of the body. The finding holds potential in controlling metastasis to reduce cancer deaths. Surgical removal of primary tumours has long been used as a standard treatment for localised tumours, but treating cancer metastasis remains a formidable challenge.

"Cancer stem cells (CSCs) are one cause of cancer metastasis. However, there is no study done so far to examine the impact of biophysical properties of cancer stem cells in cancer metastasis," said Dr. Rahul Purwar, at IIT. Contractile dynamics of a tumour cell represents one of the most important biophysical properties and is closely associated with cell spreading and cell adhesion properties of tumour cell. Increased cell contractility in breast cancer can initiate the escape of cancerous cells from their primary sites to distant organs, that is, metastasis.

Earlier researchers have shown a close relationship between cell contractility (ability of cells to contract) and invasiveness in breast cancer cells, ovarian cancer cells and melanoma cells. Increased contractility is correlated with increased migration of cells which helps in metastasis. However, it remains unknown whether contractile dynamics of CSCs are distinct as compared to the bulk tumour population and contribute in CSC-mediated metastasis.

Source: http://www.thehindu.com

Bacterial target for drug development

Researchers from Institute of Genomics and Integrative Biology (IGIB), India, have found a new target that can potentially be used for developing new antibiotics that will be effective against many bacteria. The new target is made of two proteins, which form a complex that is responsible for the formation of biofilm, that perform very important functions and are critical for bacterial ability to successfully infect humans.

The researchers have found the molecular signalling events that play a crucial role in biofilm formation in Bacillus anthracis, the causative agent of anthrax. The team found several proteins receive signals from PrkC protein. Using cutting edge genetics, molecular biology and proteomics techniques, they confirmed that GroEL was regulated by PrkC.

Bibliosafety

A database of scientific studies on biosafety and risk assessment in biotechnology

http://bibliosafety.icgeb.org

Quantum dots from mango leaves

Researchers from the Indian Institute of Technology (IIT) Bombay have used mango leaves to synthesize fluorescent graphene quantum dots, and integrated those into probes for bioimaging and intracellular temperature sensing. The unique quantum dots are reportedly biocompatible, have excellent photostability and show no cellular toxicity. To make them, the team cut mango leaves and froze them using liquid nitrogen. The frozen leaves were crushed into powder and dipped in alcohol.

The extract was centrifuged and the supernatant evaporated in an evaporator and then heated in a microwave for five minutes to get a fine powder. Using mice fibroblast cells, the team evaluated the potential of quantum dots for bioimaging and temperature-sensing applications. In mice cell in vitro studies, the graphene quantum dots were able to get into the cells easily without destroying the integrity, viability and multiplication of the cells. The quantum dots, 2-8 nanometre in size, were found to emit red luminescence when excited by UV light.

"Even when the excitation wavelength was 300-500 nanometre, the emission from the quantum dots was at 680 nanometre. The quantum dots exhibited excitation-independent emission," said a team member. The quantum dots found inside the cells showed intense florescence at 25 °C. As the temperature rises to 45 °C, the intensity of fluorescence tends to decrease. As a result, the researchers found up to 95% reduction in fluorescence intensity when the temperature was increased by 20 °C.

Source: https://www.graphene-info.com

Anti-diabetic drug from plant source

Scientists from the Central Drug Research Institute (CDRI), India, have reported that treating muscle cells with a particular type of chalcone (phenolic compound) can improve glucose uptake. This makes it particularly useful for diabetic patients. Since their muscles are insensitive to insulin resulting in poor glucose uptake, chalcone can help manage diabetes by improving glucose uptake.

Of several chalcones tested, aryloxypropanolamine had anti-diabetic properties. The effects of chalcone on blood glucose have been studied in laboratory rats which were fed on both commercially available anti-diabetic drugs like metformin and pioglitazone, and chalcone. It was found that chalcone was as effective as other drugs in reducing blood glucose levels. The findings of the study has been been published in the journal *Current Science.*

According to the scientists, "Chalcone significantly inhibited the rise of blood glucose in animals and brought back the glucose levels to normal much earlier than commercial anti-diabetic drugs. Diabetic mice showed a decrease in total cholesterol, LDL-cholesterol levels, and increased serum HDL-cholesterol like those of commercial anti-diabetic drugs." Chalcones continue to function in the body for almost a day.

Source: http://www.downtoearth.org.in

New antibiotics from fungi

Researchers at Chalmers University of Technology (Chalmers), Sweden, have discovered that using fungi as a source of new antibiotics produce many more natural and bioactive chemicals than was previously thought.

"We found that the fungi have enormous, previously untapped, potential for the production of new antibiotics and other bioactive compounds, such as cancer medicines," said Jens Christian Nielsen, at Chalmers.

Having discovered their potential, the scientists are now calling on governments to support clinical trials that would help kick-start production. When antibiotics are used, they are typically used with the short-term in mind, in contrast to the long-term therapies that help bring in revenues for pharmaceutical companies. However, the dangers posed by antibiotic resistance, where simple infections could become lethal once again, means the need for new antibiotics is now urgent.

The idea to study Fungi was inspired by the fact that the first antibiotic to be mass-produced –penicillin – was derived from *Penicillium* fungi. But while previous efforts to find new antibiotics have mainly focused on bacteria, fungi remain an untapped resource. "Fungi have been hard to study – we know very little of what they can do – but we do know that they develop bioactive substances naturally, as a way to protect themselves and survive in a competitive environment," said Christian Nielsen.

Source: http://www.factor-tech.com

Secrets of tea plant

A research team from Kunming Institute of Botany (KIB), China, has decoded the genetic building blocks of the tea plant, *Camellia sinensis*, whose leaves are used for all types of tea, including black, green and oolong. The research gives an insight into the chemicals that give tea its flavour. "There are many diverse flavours, but the mystery is what determines or what is the genetic basis of tea flavours?" said Lizhi Gao at KIB.

The Camellia grouping, or genus, contains over 100 species, including ornamental garden plants. But only *Camellia Sinensis* is grown commercially for making tea. The researchers found that the leaves of the tea plant contain high levels of chemicals that give tea its distinctive flavour. They include flavonoids and caffeine. Other members of the Camellia genus contain these chemicals at much lower levels.

Decoding the genome of the tea plant took more than five years. At three billion DNA base pairs in length, the tea plant genome is more than four times the size of the coffee plant genome and much larger than most sequenced plant species. "Our lab has successfully sequenced and assembled more than 20 plant genomes," said Prof Gao, who carried out the work with scientists in Republic of Korea and the US.

Source: http://www.bbc.com

Bacteria helps battle paddy pest

Researchers from Khon Kaen University, Thailand, have found that a bacterial species discovered in and named after the premier educational institution is capable of fighting diseases in paddy and wheat. The study reveals that *S. osmaniensis* shows "antagonistic activity" against rice blast, caused by the fungus *Pyricularia oryzae*. It will also help in the production of bio-ethanol and antibiotics.

Streptomyces osmaniensis was discovered during 2010 from the soil collected from Osmania University, India. Rice blast is a major concern for farmers and agricultural scientists alike as it affects paddy yields by about 30 per cent. The study has been published in the *Malaysian Journal of Microbiology*.

Source: http://www.timesofindia.indiatimes.com

Genetically engineered microbes

Researchers from Harvard University, the United States, have engineered microbes that, when added to soil, make fertilizer on demand, producing plants that grow 1.5 times larger than crops not exposed to the bugs or other synthetic fertilizers. The advance could help farmers in the poorest parts of the world increase their crop yields and combat chronic malnutrition.

The researchers led by Daniel Nocera have devised an artificial leaf that uses a semiconductor combined with two different catalysts to capture sunlight and use that harvested energy to split water molecules (H_2O) into H_2 and oxygen (O_2). At the time, Nocera's group focused on using the captured hydrogen as a chemical fuel, which can either be burned directly or run through a device called a fuel cell to produce electricity.

But last year, Nocera reported that his team had engineered bacteria called *Ralstonia eutropha* to feed on the H_2 and carbon dioxide (CO_2) from the air and combine them to make hydrocarbon fuels. The next step, said Nocera, was to broaden the scope of their work by engineering another type of bacterium to take nitrogen out of the air to make fertilizer.

Source: http://www.sciencemag.org

High-yielding oil palm planting material

PT SMART Tbk (SMART), a subsidiary of Golden-Agri Resources Ltd (GAR), Indonesia, has announced its breakthrough in cultivating exceptionally high-yielding oil palm planting material. The planting material was developed in the company's research centres, SMART Research Institute's (SMARTRI) and SMART's Biotechnology Centre, through an advanced biotechnology programme. The new planting materials were developed following two decades of research jointly undertaken by SMARTRI and SMART's Biotechnology Centre. They were developed naturally through conventional selection programme and tissue culture from elite palms.

These planting materials – Eka 1 and Eka 2 – are registered in Indonesia's Catalogue of Seeds and were approved for cultivationon 21 April 2017 by the Directorate General of Plantation, Ministry of Agriculture. According to the company, they will enable the company to increase yields to the highest levels in the industry, without increasing land under cultivation.

Source: http://www.fareasternagriculture.com

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