

Apprise yourself with the latest technological innovations

Highlights

- Investigation for causes of cerebral palsy
- Vaccine collaboration for HIV, Hepatitis B
- Safely releasing genetically modified genes
- Mitochondrial proteome in baker's yeast
- Miniature eyes using stem cells
- Genetically modified rice



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

Scientists gleaned data from Populus trees in a greenhouse as part of the largest-ever single nucleotide polymorphism dataset of the species' genetic variations. The information can be useful in biofuels, materials science and secondary plant metabolism research

(Credit: Oak Ridge National Laboratory, USA)

CONTENTS

Vol. 1 No. 135

Jul–Sep 2017

VATIS* Update Biotechnology

is published 4 times a year to keep the readers up-to-date of most of the relevant and latest technological developments and events in the field of Biotechnology. The update is tailored to policy makers, industries and technology transfer intermediaries.

Website: <http://www.techmonitor.net>

Editorial Board

APCTT

Ms. Michiko Enomoto
Dr. Satyabrata Sahu
Dr. Krishnan Srinivasaraghavan

BCIL

Dr. Purnima Sharma
Ms. Anita Sharma

ASIAN AND PACIFIC CENTRE FOR TRANSFER OF TECHNOLOGY

Adjoining Technology Bhawan
Qutab Institutional Area
Post Box No. 4575
New Delhi 110 016, India
Tel: (91) (11) 3097 3700
Fax: (91) (11) 2685 6274
E-mail: postmaster.apctt@un.org
Website: <http://www.apctt.org>

BIOTECH CONSORTIUM INDIA LTD.

5th Floor, Anuvrat Bhawan,
210, Deen Dayal Upadhyaya Marg,
New Delhi 110 002, India
Tel: (91) (11) 2321 9064-67
Fax: (91) (11) 2321 9063
E-mail: info.bcil@nic.in
Website: <http://www.bcil.nic.in>

The designation employed and the presentation of material in the publication do not imply the endorsement of any product, process or manufacturer by APCTT or BCIL.

This publication has been issued without formal editing

* Value Added Technology
Information Services

IN THE NEWS 4

□ GM crops regain from 2015 decline □ Investigation for causes of cerebral palsy □ Budget for bio-tech in North-Eastern India □ Biotech start-up scheme in India □ Brazil approves commercial GM sugarcane □ Trials for Parkinson's and blindness □ Cheaper drugs for diabetes, cancer in India □ Marine biotech studies in the Philippines □ Research on regenerative medicine □ Biosensor for cheap dengue diagnosis

MARKET NEWS 7

□ Partnership in genomics research □ Collaboration for anti-psoriatic drugs □ Collaborative mission for biopharmaceuticals □ Partnership for cell therapy treatment □ Vaccine collaboration for HIV, Hepatitis B □ Collaboration to aid genomics startups □ Pact for vaccine development □ Microbiome investment in Japan

GENOMICS 9

□ Researchers identify new genomic mutations □ Safely releasing genetically modified genes □ CRISPR-treated embryos □ Molecular scissors for genomic editing □ Genomics tool for analysis of single cells □ Pigeonpea genome re-sequencing □ Genome sequencing can spin disease-free jute □ CRISPR genome editing □ Gene variants linked to diabetes and CHD risk

PROTEOMICS 12

□ Mitochondrial proteome in baker's yeast □ Significant study in medicine □ Bioinformatics helps understand disordered proteins □ Protein engineering □ Neural stem cells □ Proteomics detects exposure to Zika virus

MEDICAL BIOTECH 14

□ Miniature eyes using stem cells □ Blood cancer drug □ Novel drug for blood cancer patients □ Gene switch that can turn off cancer □ Novel enzyme technology □ Regenerating skin, hair in pigs □ 3D bioprinted cartilage

AGRI BIOTECH 16

□ Genetically modified rice □ Scientists crack tur dal code □ Grapes may kill colon cancer stem cells □ Antibiotic resistance genes in soil microbes □ New antibiotic weapon against Golden Staph □ Host plants communicate warning signals □ Researchers turned to landfill sites

RECENT PUBLICATIONS 18

TECH EVENTS 18

GM crops regain from 2015 decline

According to estimates by the International Service for the Acquisition of Agri-Biotech Applications (ISAAA), global acceptance of genetically modified (GM) crops sprang back in 2016 after suffering a decline in 2015. According to ISAAA, 185.10 million hectares of GM crops were planted in 2016, showing an increase from 179.70 million hectares in 2015. In 2014, the global area under GM crops was 181.50 million hectares.

These numbers come from 26 countries, 19 of which are developing countries. The top five countries growing GM crops are the US (72.90 million hectares), Brazil (49.10 million hectares), Argentina (23.80 million hectares), Canada (11.60 million hectares), and India (10.80 million hectares) – totalling 91% of the global area under GM. Soybean accounted for 50% of the global area under GM crops in 2016.

It was followed by maize (33%), cotton (12%), and canola (5%). Other GM crops available in the market today include sugar beet, papaya, squash, aubergine and potato. ISAAA estimates that biotech crop planting increased 110-fold in the 1996-2016 decade, with an accumulated area of 2.1 billion hectares. As the “fastest adopted crop technology in recent times”, biotechnology has helped alleviate poverty and hunger, benefiting 18 million small farmers and their families.

Source: <http://www.asianscientist.com>

Investigation for causes of cerebral palsy

A new international research group has been established to investigate the underlying genetic causes of cerebral palsy, spurred on by the discoveries from researchers of University of Adelaide, Australia. The news comes as the Adelaide team behind the new collaboration has been awarded a \$1 million grant to continue its groundbreaking work, from The Tenix and Cerebral Palsy Foundations.

The newly established International Cerebral Palsy Genomics Consortium (ICPGC) includes members from universities in China, Canada, USA, Sweden, Turkey, and Australia. The consortium has grown under leadership of Dr. Alastair MacLennan and Dr. Jozef Gecz, at the University of Adelaide. Professors MacLennan and Gecz and their Cerebral Palsy Research Group have led the field internationally in showing that cerebral palsy is often linked to a genetic susceptibility.

“For decades, it has been the belief that cerebral palsy occurs when a child experiences a lack of oxygen during pregnancy or at birth. However, the evidence shows that at least one in four cerebral palsy cases is associated with genetic mutations,” said Dr. MacLennan. The group has built up a large DNA biobank from cerebral palsy families linked to de-identified pregnancy details and cerebral palsy type.

Source: <https://www.eurekalert.org>

Budget for bio-tech in North-Eastern India

With a view to promote biotechnology in North-Eastern Region

(NER) of the country, the Department of Biotechnology (DBT), under the Ministry of Science and Technology, government of India, has allocated 10% of its total annual budget towards biotechnology-backed development activities in the region.

Towards this commitment, DBT established the North Eastern Region-Biotechnology Programme Management Cell (NER-BPMC) in 2009-10, functioning through Biotech Consortium India Limited (BCIL), for implementation and monitoring of biotechnology programmes in the NER.

Apart from continuing the ongoing projects in North-East in various areas of life sciences and biotechnology, during this year, 30 scientists/faculty have been selected for bringing advancement in the biotechnology and life science related activities in various institutions of research and higher learning in the NER under ‘DBT-NER Visiting Research Professorship (VRP) Scheme’.

Source: <http://www.uniindia.com>

Biotech start-up scheme in India

Bio-technology firms in India are likely to soon get a relaxation of an additional 3-years in the eligibility criteria for being recognised as start-ups. The Department of Bio-technology (DBT) has sent a formal proposal to the Department of Industrial Policy and Promotion (DIPP) stating that the requirement of registration of entities not prior to 5-years should be extended to 8-years for bio-tech firms as their gestation period is more than other sectors.

The change in the duration criteria for bio-tech start-ups is likely to be a part of the overall changes in the

definition of start-ups that the DIPP is planning to bring about. The DIPP will also not bring about any changes in the eligibility criteria for tax incentives. At present eligible start-ups can make use of their 3-year tax holiday in a block of 7-years. Apart from tax sops, start-ups, meeting the 5-year duration criteria, are eligible for several other incentives.

Start-ups falling under the list of 36 “white” category industries get exemption from a number of environmental laws and labour law relaxations. To give a leg up to start-ups, public procurement norms for micro and small enterprises have been eased. The Department of Expenditure has also notified that all Central Ministries/Departments may relax condition of prior experience and prior turnover in public procurement to all start-ups subject to their meeting quality and technical specifications.

Source: <http://www.thehindu.com/businessline.com>

Brazil approves commercial GM sugarcane

Brazil has approved commercial use of a genetically modified (GM) sugarcane, setting a milestone for the country’s highly competitive sugar industry as this is the first time such permission has been granted anywhere in the world. Authorization was obtained by CTC Centro de Tecnologia Canavieira SA, which developed the technology and made the application seeking approval in December 2015.

“Brazil has about 10 million hectares of sugarcane fields and potential to plant GM cane in up to 15% of this area. Given the characteristics of the crop, this may take 10 years to achieve,” said Chief Executive Officer Gustavo Leite. CTC

has made applications to clear sale of sugar made from GM cane in the United States and Canada. It will seek regulatory approval in China, India, Japan, Russia, Republic of Korea and Indonesia.

According to CTC, the new variety is resistant to the insect *Diatraea saccharalis*, known locally as ‘broca-da-cana’ (cane borer), one of the main plagues in Brazil’s sugarcane fields, with an estimated 5 billion reais (\$1.52 billion) of annual losses to producers. The GM cane contains the gene Bt (*Bacillus thuringiensis*), widely used in other crops.

Source: <http://www.reuters.com>

Trials for Parkinson’s and blindness

In a world first, surgeons in the Chinese city of Zhengzhou are planning to inject stem cells derived from human embryos into the brains of patients with Parkinson’s disease with the aim of treating their debilitating symptoms. Meanwhile, another medical team in the same city is aiming to target vision loss using embryonic stem cells (ESC) to replace lost cells in the retina, marking a new direction in China in the wake of major changes in how the country regulates stem cell treatments.

While similar treatments on Parkinson’s patients have already been tested in Australia, those trials relied on cells taken from eggs that were forced to divide without first being fertilised in an effort to circumvent any ethical concerns. Stem cells are a little like blank slates that are yet to take on a specific task. If you rewind the clock on any of your body’s tissues, its cells will become less specialised, until you’re left with a cell with a lot of potential to become nearly anything.

In the case of both kinds of embryonic stem cells, divided egg cells are subjected to various treatments to encourage them to develop into replacement cells that could treat a condition in a recipient. The symptoms of Parkinson’s disease are largely caused by a loss of nervous tissue deep inside the brain in an area called the basal ganglia. Losing those cells means a loss of a neurotransmitter called dopamine, and with it a lower ability to control nervous impulses that would prevent muscles in the extremities from activating.

Source: <https://www.sciencealert.com>

Cheaper drugs for diabetes, cancer in India

Serving the twin purposes of providing affordable drugs to patients and making Indian biotech industry globally competitive, the department of biotechnology (DBT) will soon unveil biosimilar drugs for diseases such as cancer, diabetes and rheumatoid arthritis. “With manufacturing of indigenous drugs, an ecosystem will be created for innovative indigenous product development by researchers, startups and SMEs to make Indian biotech industry globally competitive,” said Renu Swarup, at DBT.

India which today occupies only 3% of the global market aims to reach 5% by 2022. According to a recent report by India Brand Equity Foundation (IBEF) under department of commerce, ministry of commerce and industry, there is a market shift to diseases like cardiac conditions, diabetes and cancer which have treatment options with complex biotech drugs. A rise in number and quality of tertiary care centres is leading to greater usage of biotech products.

"In India, there is a large pool of patients that consumes these drugs. With biosimilars, the indigenous drugs will be available at a much less price which will in turn benefit patients in the long run," said Swarup. According to government, the Indian biopharmaceutical industry is around 10-15 years behind its counterparts in the developed countries and faces stiff competition from China and Republic of Korea in respect of innovation.

Source: <http://www.livemint.com>

Marine biotech studies in the Philippines

According to Dr. Lourdes Taylo, at the University of the Philippines Los Baños (UPLB), advances in marine biotechnologies are currently being done to develop compounds useful to eradicate disease-causing viruses. The Department of Science and Technology, specifically the Philippine Council for Agriculture, Aquatic, and Natural Resources Research and Development (PCAARRD) is on its exploratory stages for the Philippine PharmaSeas Drug Discovery Program through the Marine Science Institute of the UP-Diliman," said Dr. Taylo.

The project was started because of the emergence of drug-resistant disease-causing microorganisms. Because of this, the scientists saw the need to develop drugs and other useful chemical compounds to eradicate the microorganisms. According to their earlier studies, marine sponges contain biologically active compounds against tuberculosis, pneumonia, and other infectious diseases.

Marine snail venoms, specifically that of turrid snails, had been discovered significant in cancer

management as well as the combination therapy component of the antibiotics detected in them. With these new projects in the pipeline of the research and development sector, Taylo warned consumers and farmers to be wary of fake news about biotechnology that may be spreading around, creating false fear about the technology.

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

Research on regenerative medicine

A forum representing the Indian biotechnology sector has inked a memorandum of understanding (MoU) with Japan's Forum for Innovative Regenerative Medicine (FIRM) to accelerate research on regenerative medicine.

The partnership between the Association of Biotechnology Led Enterprises (ABLE) and FIRM is a unique platform to advance and promote commercialisation of life-saving products in regenerative medicine in both the countries.

The collaborative programmes between ABLE and FIRM will focus on advancing the individual and common missions by sharing information including technology, policy, partnerships and opportunities such as co-sponsoring meetings and other cooperation based on common concern. The MoU was signed by P. Manohar, Head of the Committee for Regenerative Medicine Group of ABLE and FIRM chairman Yuzo Toda.

Source: <http://www.moneycontrol.com>

Biosensor for cheap dengue diagnosis

Scientists at Federal University of Paraná (UFPR), Brazil, have developed a biosensor that can

quickly detect dengue and could help create a cheap tool to diagnose the painful mosquito-borne virus that infects millions each year. "They are looking to produce a testing kit that would cost clinics and hospitals around \$30 and take about 15 minutes to analyse blood samples for a key dengue protein," said Cleverton Luiz Pirich, at UFPR.

A biosensor is an analytical device that converts a biological response into an electrical signal. "You can do a diagnosis very fast, at a very low cost, and you don't need to have a lot of knowledge of this equipment," added Pirich. The scientists coated the biosensor with a thin film of bacterial cellulose nanocrystals, which effectively detected a protein known as NS1 from blood samples.

Researchers now want to explore ways to create cost-effective biosensor components that could be used to analyse multiple blood samples. The technology could potentially be adapted to detect proteins from viruses such as Zika, which is also transmitted by the *Aedes aegypti* mosquito. Endemic in Latin America and Asia, dengue infects hundreds of millions of people each year, and is becoming more prevalent.

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

Biosafety Clearing-House

The Biosafety Clearing-House (BCH) is a mechanism set up by the Cartagena Protocol on Biosafety to facilitate the exchange of information on Living Modified Organisms (LMOs) and assist the Parties to better comply with their obligations under the Protocol.

For more information, access:

<https://bch.cbd.int>

Partnership in genomics research

The All India Institute of Medical Sciences (AIIMS) Delhi and CSIR Institute of Genomics and Integrative Biology (CSIR-IGIB) in India has inked a deal for collaborative research in the area of rare diseases and application of genomics to aid clinical decisions. As part of the agreement, AIIMS Delhi and CSIR-IGIB would collaborate in the area of genetic diseases as well as application of genomics in clinical settings.

This would include formulation and participation in joint collaborative programs spanning genomics for aiding the diagnosis, understanding the prognosis and aiding precise therapy of genetic diseases. The deal would also enable faculty members of both institutes to actively participate in formulating and implementing collaborative programs aimed at accelerating the application of genomics to aid clinical decisions.

The deal would also allow AIIMS Delhi to access the state of the art genomics and bioinformatics infrastructure as well as the clinical genomics analytical resources at CSIR IGIB to enable fast, accurate and cost effective diagnosis of genetic diseases for patients coming to AIIMS Delhi.

Source: <http://www.pr.com>

Collaboration for anti-psoriatic drugs

The Department of Science and Technology (DST), Government of India will work jointly with Dr. Reddy's Laboratories Ltd, University of Hyderabad (UoH) and Dr. Reddy's Institute of Life Sciences (DRILS) for discovery and development of anti-psoriatic drugs. The DST and

DRL sponsored project will work on 12-R-Lipoxygenase as target for the discovery and development of drugs for psoriasis.

The project cost is estimated at Rs 190 lakh. The psoriasis and other skin disorders market is currently about \$6-7 billion and expected to be reach \$13 billion in the next 10 years. In the long term, it is proposed to establish a national R&D facility to work on inflammatory disorders.

Source: <http://www.thehindubusinessline.com>

Collaborative mission for biopharmaceuticals

India's Cabinet Committee on Economic Affairs chaired by the Prime Minister Narendra Modi has given its approval for Industry-Academia Collaborative Mission for accelerating discovery research to early development for biopharmaceuticals. Named as "Innovate in India, empowering biotech entrepreneurs & accelerating inclusive innovation", it will be funded by the government of India.

The Mission will be implemented by Biotechnology Industry Research Assistance Council (BIRAC) – a Public Sector Undertaking of Department of Biotechnology (DBT). The Mission Programme would be a Pan-India program. The key focus areas of the program would aid in preparing India's technological and product development capabilities in the biopharmaceutical sector to a level that it is globally competitive over the next 10-15 years.

It will transform the health standards of India's population through affordable product development. Total project cost to be funded by

Government of India is Rs. 1500 crore for five years. 50% cost for the Mission Programme will be arranged through the World Bank loan. For the implementation, a Programme Management Unit will be set up at BIRAC which will work as an operational and functional arm that will monitor program's implementation and progress.

Source: <http://www.pharmabiz.com>

Partnership for cell therapy treatment

Apollo Hospitals, has partnered with RMS REGROW, the first 'Make in India' Company in Cell Therapy Technology, to offer two new Regenerative Medicine Cell Therapy products – Ossron and Chondron for bone and cartilage problems, respectively. The two products will address unmet clinical needs in the orthopaedic market with respect to sports injuries, accidents and alternate to hip replacements and knee replacements for a young arthritic knee.

In an exclusive tie up between Apollo Hospitals and RMS Regrow, the treatment therapy will be made available across all Apollo Hospitals, Apollo Spectra Hospitals and Apollo clinics in India. Ossron and Chondron are the results of a dedicated research team at REGROW. The two products are innovative proprietary and patented technology which has been developed for both the products following the regulatory guidelines.

Through several clinical trials and evaluation studies over 8 years, the company has achieved the market authorization for the two cell therapy products. As an exclusive offering, Apollo Hospitals will create a platform for orthopaedic doctors to practice Regenerative Medicine efficiently by conducting

live surgical workshops, CME's for doctors and conferences (national and international).

Source: <http://www.pharmabiz.com>

Vaccine collaboration for HIV, Hepatitis B

Johnson & Johnson's Janssen Pharmaceuticals, Belgium, has licensed Denmark based Bavarian Nordic's Modified Vaccinia Ankara-Bavarian Nordic (MVA-BN[®]) technology toward development of new vaccines for human immunodeficiency virus (HIV) and hepatitis B virus (HBV), under an up-to-\$879 million agreement that expands the companies' ongoing collaboration.

Janssen Pharmaceuticals, part of J&J's Janssen Pharmaceutical Companies, has gained exclusive rights to MVA-BN, which it will combine with Janssen's own AdVac[®] technology platform as the companies develop new vaccines for HIV and HBV. The agreement was announced yesterday. Three days earlier, J&J trumpeted positive first-in-human clinical data generated by Janssen for its investigational HIV-1 vaccine regimen.

Mosaic-based vaccines contain immunogens created using genes from different HIV subtypes responsible for HIV-1 infections worldwide. The immunogens are delivered through viral vectors, including Janssen's AdVac technology based on adenovirus serotype 26 (Ad26). The viral vectors are combined with other components, such as soluble proteins, to form mosaic-based prime-boost vaccine regimens designed to produce stronger and longer-lasting immunity to HIV.

Source: <http://www.genengnews.com>

Collaboration to aid genomics startups

Helix, the United States, has teamed up with startup creation engine Illumina Accelerator, the United States. Through the collaboration, they will partner with entrepreneurs looking to promote innovation in the genomics space. Selected entrepreneurs will gain access to Helix's team of experts, who have experience in everything from regulatory affairs to business development to bioinformatics.

Helix itself is an Illumina spinout – it was created in 2015 from a partnership between Illumina, Warburg Pincus and Sutter Hill Ventures. The goal was to become a digital hub for consumers to obtain genetic tests and complementary services from third parties. Since then, the company has partnered with multiple organizations, including Good Start Genetics, the United States, and Duke University, the United States, to advance its mission.

Most recently, it launched an online marketplace for consumer-facing products that provide information on ancestry, family, health and fitness. As for Illumina Accelerator, it recently unveiled its sixth cycle of startups. The class included five companies: Checkerspot, Chimera Bioengineering, Encompass Bioscience, Mantra Bio and Solarea Bio. The accelerator operates on a 6-month funding cycle, giving startups the chance for business assistance.

Source: <http://www.medcitynews.com>

Pact for vaccine development

Takeda Pharmaceutical Company, Japan, and Biological E Ltd (BE), India, have signed two licensing agreements for development and

delivery of affordable combination vaccines for low and middle-income countries. According to BE, Takeda will transfer to BE its existing measles and acellular pertussis vaccine bulk production technology.

The transfer also will include the provision of technical services such as support in infrastructure review, training for production and quality control, assistance in process development, preclinical study design, and production of clinical batch and the first commercial batches. BE will commercialise the vaccine in India, China and low and middle-income countries where large, unmet public health needs exist.

Source: <http://www.health.economictimes.indiatimes.com>

Microbiome investment in Japan

Anaeropharma Science, Japan, has developed novel genetically enhanced bacteria to fight tumours. The company's lead product APS001F is based on an obligate anaerobic bacterium. *Bifidobacterium longum* can only proliferate in the hypoxic core of solid tumours, where it secretes the enzyme cytosine deaminase turning a systemically administered prodrug into a cytotoxic agent, which hollows out the tumour from the inside.

The company is currently conducting a Phase Ib/IIa trial of APS001F in patients with advanced solid tumours in the United States. The investment of US\$13.2m (€11.6m) will strengthen a Japanese leader in the microbiome sector. Anaeropharma will use the financing to accelerate the development of multiple programmes based on its proprietary platform technology.

Source: <https://www.european-biotechnology.com>

Researchers identify new genomic mutations

An international team of researchers has identified genomic mutations for Carey-Fineman-Ziter (CFZS) syndrome, a very rare congenital myopathy (inherited muscle disorder) characterized by facial weakness, a small or retracted chin, a cleft palate and curvature of the spine (scoliosis), among other symptoms. The researchers determined that CFZS is caused by mutations in the gene MYMK that encodes for the protein myomaker.

This protein is necessary for the fusion of muscle cells (myoblasts) into muscle fibers (myotubes) during the development of an embryo and the regeneration of muscle cells after injury. "This discovery will improve physicians' ability to diagnose this disease and offer families accurate genetic counseling and treatment," said Irini Manoli, at the National Human Genome Research Institute (NHGRI), part of NIH, the United States.

People affected with CFZS have sometimes been misdiagnosed with Moebius syndrome, another very rare disorder characterized by facial paralysis. Dr. Manoli said that uncovering that cell-cell fusion deficits can lead to congenital myopathies (inherited muscle disease) opens a new path of exploration for therapies for CFZS and other muscular diseases and tools for regenerating muscle.

In addition to NHGRI, study collaborators included researchers at the National Institute of Neurological Disorders and Stroke (NINDS), the NIH Clinical Center, the United States, the Boston Children's Hospital affiliated with Harvard University, the United States, Icahn School of Medicine, the United States, the University of Utah, the United States, and the University of Otago, New Zealand.

Source: <https://www.genome.gov>

Safely releasing genetically modified genes

Applied mathematicians and physicists from Harvard University, the United States, and Princeton University, the United States, used mathematical modeling to guide the design and distribution of genetically modified (GM) genes that can both effectively replace wild mosquitoes and be safely controlled. In the normal course of evolution, any specific trait has only a modest chance of being inherited by offspring. The research has been published in the *Proceedings of the National Academy of Sciences*.

But, with the development of the CRISPR-Cas9 gene editing system, researchers can now design systems that increase the likelihood of inheritance of a desired trait to nearly 100 percent, even if that trait confers a selective disadvantage. These so-called gene drives could replace wild-type genes in short generations. Those powerful systems raise serious safety concerns, such as what happens if a genetically-engineered mosquito accidentally escapes from a lab?

"An accidental or premature release of a gene drive construct to the natural environment could damage an ecosystem irreversibly," said Hidenori Tanaka, at the Harvard John A. Paulson School of Engineering and Applied Sciences (SEAS). To protect against such releases, Tanaka, along with co-authors David Nelson, the Arthur K. Solomon at Princeton, proposed a narrow range of selective disadvantages that would allow the genes to spread, but only after a critical threshold had been reached.

Source: <https://www.sciencedaily.com>

CRISPR-treated embryos

A team of scientists have edited viable human embryos for the first time in the United States. Details of the feat were sketchy at the time, but the researchers revealed their success in correcting a mutation in the gene MYBPC3 that causes a heart condition. "It's a pretty big milestone. People have been wringing their hands about the U.S. losing its edge because it was China making progress. But the careful work just took longer to get to fruition," said George Church, at Harvard University.

MYBPC3 has been known as a cause of hypertrophic cardiomyopathy, or muscle thickening in the heart, for decades. Paula Amato and Shoukhrat Mitalipov of Oregon Health & Science University (OHSU), the United States, along with a large team of collaborators, sought to use CRISPR-Cas9 to introduce a break in the DNA at the mutation site, where a proper sequence could then be introduced. They recruited a dozen healthy egg donors and one sperm donor who carried the MYBPC3 defect.

According to the report, the donor managed his heart condition with an implantable defibrillator and medication. The researchers first tested their technique on induced pluripotent stem cells (iPSCs), finding that about 27% of clones were fixed. They then turned to embryos, none of which were intended for implantation. Dozens were treated with CRISPR, some as already-fertilized zygotes (during S-phase) and others as earlier oocytes (during M phase), into which they simultaneously injected sperm and the CRISPR reagents.

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

Molecular scissors for genomic editing

CRISPR (Clustered Regularly Interspaced Palindromic Repeats) gene editing technology allows permanent modification of genes within organisms. Since its discovery, it is considered a breakthrough in biotechnology ever. Researchers from the University of Copenhagen, Denmark, led by Guillermo Montoya, now went one step further. They discovered how Cpf1, a new type of molecular scissors, unzip and cleave DNA. In their study, the scientific team described how this new system for genome editing works for the first time.

The Cpf1 protein enables the cleavage of double stranded DNA, allowing the initiation of the genome modification process. It is a member of the CRISPR-Cas family and acts like a GPS in order to identify its destination within the genome. Because the molecular scissors are highly precise in identifying the target DNA sequence, they enable safer modifications and editing instructions written in genome.

Researchers from Novo Nordisk Foundation Center for Protein Research, Denmark, used an X-ray Crystallography, to illuminate molecular structures and observe structures at atomic resolution. The structure reveals the machinery involved in DNA unwinding to form a CRISPR RNA (crRNA) – DNA hybrid and a displaced DNA strand. Applications for CRISPR/Cas9 system for cutting and pasting genome sequences are growing fast. The technology is already being used to modify animal and plant genomes and is starting to be adopted for human therapy.

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

Genomics tool for analysis of single cells

Scientists at the New York Genome Center (NYGC), the United States,

have developed a new technique that represents an important step forward for single-cell RNA sequencing, an advancing field of genomics that provides detailed insights into individual cells and makes it possible to distinguish between different cell types and to study disease mechanisms at the level of individual cells.

Cellular Indexing of Transcriptomes and Epitopes by sequencing (CITE-seq), couples the measurement of surface protein markers on thousands of single cells with simultaneous sequencing of the messenger RNA (mRNA or transcriptomes) of those same single cells. The NYGC researchers monitored 10 surface proteins, together with transcriptomes, of 8,000 single cells, the largest scale demonstration of multidimensional single-cell analysis to date.

The protein detection component of CITE-seq is based on DNA-barcoded antibodies, which produce a sequencable readout that is captured along with the transcriptome of the cell. The integration of the protein and RNA data generated by CITE-seq required custom data analysis, was developed in the lab of Rahul Satija, at NYGC. As an example of the power of CITE-seq, the investigators used the multimodal data to identify subclasses of natural killer (NK) cells that are difficult to distinguish based on transcriptomes alone.

Source: <https://www.phys.org>

Pigeonpea genome re-sequencing

In a major breakthrough, a team of 19 scientists from 9 institutes have re-sequenced the genome or DNA of 292 pigeonpea varieties (*Cajanus cajan* – commonly called arhar or tur dal in India) and discovered new traits such as resistance to various diseases that affect the crop and its insensitivity to photo-period (the duration of

daylight hours required for reaching maturity). The research also traces the likely origin of the domesticated pigeonpea to Madhya Pradesh.

This breakthrough will lead to the development of superior varieties of this important pulse crop which can enable higher production and profits for smallholder farmers, better market value and bring it within an affordable price range for the consumer, especially the poor. Pigeonpea is a major source of protein, fiber, minerals, vitamins and resistant starch. It is important for ensuring nutritional security for millions in the developing world. The discovery have been published in the journal *Nature Genetics*.

The 9 collaborating institutes are the University of Western Australia; Shenzhen Millennium Genomics Inc., China; Macrogen Inc., Republic of Korea; Professor Jayashankar Telangana State Agricultural University (PJTSAU), India; University of Agricultural Sciences (UAS), India; University of California-Davis, the United States; Florida International University, the United States; Visva-Bharati, Shantiniketan, India and led by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), India.

Source: <http://www.icrisat.org>

Genome sequencing can spin disease-free jute

Agricultural researchers from Indian Council of Agricultural Research (ICAR) have mapped the genome of a popular jute crop grown in the country, making it possible for them to breed newer varieties endowed with better traits. According to the scientists, the sequencing has helped them identify several thousands of genes that are capable of conferring disease resistance, yield improvement, and better fibre quality.

For the mapping, the scientists led by Nagendra Kumar Singh, of ICAR, used a dark jute variety called Navin, which is popularly grown by farmers in India and Bangladesh. Navin is a cross between a jute variety sourced from Sudan and an indigenous one. It has been in cultivation for more than a decade. Dark jute varieties, commonly known as *tossa* among farmers, account for 90% of the jute cultivated in the country.

This is because dark jute produces softer and stronger fibres, but also because farmers use it for crop rotation in paddy fields. “Conventionally, developing a new crop variety takes 12 to 15 years. But having genomic data and DNA markers can bring down the time required for breeding a better variety six to seven years,” said Singh. Indian breeders in the past have used African jute to transfer premature flowering resistance to indigenous types, which were susceptible to premature flowering in early sowing during March.

Source: <http://www.thehindubusinessline.com>

CRISPR genome editing

Integrated DNA Technologies (IDT), the United States, has launched the first Cas9 enzyme variant that extensively reduces off-target effects in CRISPR genome editing without compromising on-target activity. The Alt-R® S.p. HiFi Cas9 Nuclease 3NLS enzyme is a recombinant *S. pyogenes* Cas9 mutant that improves specificity while maintaining a high editing efficiency similar to wild-type Cas9.

The launch represents a major step towards therapeutic use of CRISPR, which has previously borne the risk of the unwanted off-target editing events observed with wild-type Cas9. Earlier Cas9 mutants that offer improved specificity suffer from a moderate to severe loss of on-target activity when used as an RNP complex. CRISPR-Cas9

genome editing has revolutionized life science research, but concern about unwanted off-target editing events has been a stumbling block for researchers considering therapeutic applications.

The largely preferred method of delivering genome editing reagents as RNP complexes reduces, but does not eliminate, the risk of off-target editing. However, recent attempts at rational design of Cas9 mutants with reduced off-target activity traded on-target activity for improved specificity, and produced mutants generally unsuitable for use in RNP delivery. To successfully provide a Cas9 mutant with radically reduced off-target effects while maintaining high on-target activity, IDT screened more than 250,000 mutants in two rounds of selection.

Source: <https://www.news-medical.net>

Gene variants linked to diabetes and CHD risk

In a large analysis of genetic data, published on August 28, 2017 in *Nature Genetics*, a team, led by researchers in the Perelman School of Medicine at the University of Pennsylvania, has first looked into what causes Type 2 diabetes (T2D) and second clarified how T2D and CHD – the two diseases that are the leading cause of global morbidity and mortality, are linked.

Examining genome sequence information for more than 250,000 people, the researchers first uncovered 16 new diabetes genetic risk factors, and one new coronary heart disease (CHD) genetic risk factor; hence providing novel insights about the mechanisms of the two diseases. They then showed that most of the sites on the genome known to be associated with higher diabetes risk are also associated with higher CHD risk. For eight of these sites, the researchers were able to identify a specific gene variant that influences risk for both

diseases. The shared genetic risk factors affect biological pathways including immunity, cell proliferation, and heart development.

The findings add to the basic scientific understanding of both these major diseases and point to potential targets for future drugs. The researchers started by examining sets of genome data on more than 250,000 people, of South Asian, East Asian or European descent. In this large, multi-ethnic sample they were able to confirm most of the known diabetes “risk loci”-; sites on the genome where small DNA variations have been linked to altered, usually higher, diabetes risk -; and uncover 16 new ones.

With their analyses of the genome data, the scientists were also able to identify eight specific gene variants that are strongly linked to altered risk for both diseases. Seven of these gene variants, as expected, appeared to increase risk for both diseases. The researchers found evidence that, on the whole, the genetic link between the diseases appears to work in one direction, so that risk genes for type 2 diabetes are much more likely to be associated with higher CHD risk than the other way around. Additionally, there could be some pathways where pharmacological lowering of one disease increases the risk of the other.

Source: <https://www.news-medical.net>

UNIDO Biosafety Manual

The United Nations Industrial Development Organization (UNIDO) Biosafety Manual provides practical guidance for national authorities that are in the process of developing national biosafety regulations.

For more information, access:

<http://binas.unido.org/manual/>

Mitochondrial proteome in baker's yeast

A team of scientists from the universities of Freiburg, Homburg, and Rehovot (Israel) led by Prof. Dr. Bettina Warscheid, Prof. Dr. Nikolaus Pfanner, and Prof. Dr. Nils Wiedemann have discovered, counted and determined new mitochondrial proteins with unknown function in the model organism baker's yeast. The study will serve as a source of information for researchers interested in the biology of mitochondria – from yeast to human subjects. This research was funded through European Research Council (ERC) Consolidator Grants.

Using 'quantitative mass spectrometry' and bioinformatics methods, a team from Warscheid's research group first determined the abundance of thousands of proteins in different cellular fractions of baker's yeast. A team from Wiedemann's research group then analyzed mitochondrial proteins using biochemical methods and microscopy. The resulting mitochondrial proteome comprises a total of 901 proteins, including 82 proteins not previously associated with mitochondria.

For an additional 119 a mitochondrial localization had been ambiguous. While humans require oxygen to breathe, yeast cells can either consume oxygen or use a different metabolic pathway called fermentation, a process well known for producing alcoholic beverages. The researchers cultured yeast cells in a fermentative or respiratory medium and determined that the shift from fermentative to respiratory conditions caused dramatic changes in the mitochondria. The

study has been published in the scientific journal *Cell Reports*.

Source: <https://www.news-medical.net>

Significant study in medicine

The Pacific Northwest National Laboratory (PNNL), the United States, is part of a nationwide effort to learn more about the role of proteins in cancer biology and to use that information to benefit cancer patients. PNNL has paired with physicians and scientists at Oregon Health & Science University (OHSU), the United States, in one of three projects by the National Cancer Institute (NCI), the United States, to bring detailed data about proteins to the bedsides of participants in current clinical trials.

The OHSU-PNNL team is studying acute myeloid leukemia, the most common type of acute leukemia in adults. Other teams nationwide are focusing on breast and ovarian cancer. The study at the OHSU Knight Cancer Institute is sponsored by NCI and will include up to 200 participants. Physicians will look at the safety and effectiveness of several FDA-approved drugs that inhibit cell signaling that occurs in patients with acute myeloid leukemia. The study is led by Brian J. Druker, with funding from the Leukemia and Lymphoma Society.

For the current study, scientists will analyze blood samples from the study participants, looking at specific levels of proteins. The hope is to identify proteins that indicate which patients respond well to specific treatments and which patients don't respond to treatment, an important step to personalize therapies for patients. Last year, scientists took an in-depth look at the proteins in the tumors of 169

ovarian cancer patients, marking one of the biggest studies in proteogenomics.

Source: <http://www.pnnl.gov>

Bioinformatics helps understand disordered proteins

To help shed light on the workings of proteins, researcher Lukasz Kurgan, at Virginia Commonwealth University, the United States, has developed a series of bioinformatics programs to assist biologists in developing insights into the functions of intrinsically disordered proteins. This group of proteins lacks a fixed structure, which means they are totally or partially flexible and amorphous.

Over the last several decades, scientists have sequenced 85 million unique proteins, structured and unstructured alike, but still don't know what the vast majority of these proteins do. As more proteins are discovered, more sophisticated computer programs must be developed to help determine their functions. "We have manually curated but understand less than 1% of these proteins, and right now there's over 80 million to solve," said Kurgan.

Determining a protein's function becomes even more challenging when a protein is completely or partially disordered. When a protein does have a defined structure, researchers use prior knowledge and bioinformatics programs to first decipher that structure, which then helps determine function. If the protein is disordered, biologists turn to programs built by Kurgan and team that use predictive models to generate workable hypotheses on the protein's function.

Source: <https://www.technologynetworks.com>

Protein engineering

A group of researchers from the UW Medicine Institute for Protein Design at the University of Washington, the United States, and the University of Toronto, Canada, recently conducted the largest-scale testing of folding stability for computationally designed proteins. More than 15,000 newly designed small proteins were tested for correlation between folding and function which resulted in significant protein modeling improvements. The new study will speed up progress in designing more stable proteins.

“Computationally designed proteins often fail to form the folded structures that they were designed to have when they are actually tested in the lab,” said lead author Rocklin. Two advanced technologies were used, synthetic DNA and high throughput screening. This new approach, which incorporates advances in DNA synthesis technology, greatly reduced the experimental costs. Researchers tested more than 15,000 newly designed mini-proteins that do not exist in nature, to see whether they form folded structures.

It is a huge step forward since protein design studies in the past have generally examined only about 50-100 different designs. Recent testing led to the design of 2,788 stable protein structures. Small size of these proteins could be advantageous for treating diseases when the drug needs to reach the inside of a cell. “Still, even simple proteins are so complicated that it was important to study thousands of them to learn why they fold,” said Rocklin. The study has been published in the journal *Science*.

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

Neural stem cells

Researchers at the Duke-NUS Medical School, Singapore, have found proteins that can reactivate neural stem cells (NSCs). Their research could lead to stem cell-based therapies for neurodevelopmental and neurodegenerative disorders such as microcephaly and Alzheimer’s disease. Only a small fraction of NSCs in adult mammalian brains is proliferative; most NSCs are in a non-dividing state also known as quiescence.

The balance between NSC proliferation and quiescence is essential for brain development and emerging evidence suggests that its imbalance is linked to neurodevelopmental disorders, such as microcephaly. On the other hand, the population of quiescent NSCs in the brain increases with aging, which is associated with declining brain function. Understanding how endogenous NSCs can be activated has huge potential in regenerative medicine.

However, it is poorly understood how NSCs switch between proliferation and quiescence in vivo. In the present study, researchers used fruit flies (*Drosophila melanogaster*) to show that proteins in the spindle matrix complex play an essential role in controlling gene expression during NSC reactivation. The study has been published in the journal *Nature Communications*.

Source: <https://www.asianscientist.com>

Proteomics detects exposure to Zika virus

Researchers from the Schulich School of Medicine & Dentistry, Western University, Canada, and a team of international, have used

proteomics to examine proteins and peptides in saliva to accurately detect exposure to Zika virus.

By analysing the saliva of a pregnant mother infected with Zika and her twins – one born with microcephaly and one without – the researchers could pinpoint the specific protein signature for Zika that is present in saliva, creating potential to use this signature as an effective way to screen for exposure.

Dr. Walter Siqueira at the Western University, Canada, and team also discovered important clues about how the virus passes from mother to baby and its role in the development of microcephaly, a birth defect in which a baby’s head and brain is smaller than expected.

The research suggests a vertical transmission of the virus between mother and baby. The mutations in the amino acid sequence of the peptides that were different for each twin, suggesting that these mutations may play a role in whether a baby will develop microcephaly.

“We are very excited to publish findings that shed light on the transmission of Zika virus and present an innovative approach to assessing the presence of Zika virus. This research has the potential to positively impact global health. By detecting the virus, the infected individuals can have their symptoms and the virus progression properly monitored, as well as take action to stop the spread of the virus which causes these devastating craniofacial defects in newborns,” said Dr. William Gianobile.

Source: <https://www.drugtargetreview.com>

Miniature eyes using stem cells

A team of researchers led by Dr. Indumathi Mariappan at the LV Prasad Eye Institute (LVPEI), India, have successfully grown miniature eye-like organs that closely resemble the developing eyes of an early-stage embryo. The miniature eyes were produced using induced pluripotent stem (iPS) cells. The iPS cells are produced by genetically manipulating human skin cells to produce embryonic-like stem cells that are capable of forming any cell types of the body.

Small portions of the corneal tissue were separated from the miniature eyes and used for growing corneal epithelial cell sheets in the lab. Such tissue-engineered cell sheets can potentially be used for restoring vision in patients whose limbus region of the cornea is damaged in both the eyes. The limbus region of the cornea contains stem cells, and chemical or thermal damage to this region affects corneal regeneration and results in vision loss.

Stem cells present in the limbus region of a healthy eye have been used for restoring vision when only one eye is damaged. But when the damage is present in both eyes, the only way to restore vision is by using the healthy limbus taken from a related or unrelated donor. Patients have to be on immunosuppressants lifelong when limbus is transplanted from donors. However, immunosuppressants are not required when corneal cells grown using the patient's own skin cells are used for restoring vision.

Source: <http://www.thehindu.com>

Blood cancer drug

Researchers at the Indian Institute of Science (IISc), India, have

synthesised a small molecule that shows a degree of promise as an anticancer agent. In particular, the inhibitor was effective against leukaemia. The work was done in collaboration with researchers from the University of Mysore. The molecule (a benzothiazole derivative), codenamed 5g, was found to be effective in inhibiting cell proliferation in both leukaemia and breast cancer cell lines.

This was achieved by arresting a particular phase (G2/M) of the cell cycle, thereby preventing cancer cells from dividing and growing in number. In the case of mouse models, the 5g molecule was able to arrest tumour growth without causing significant side-effects. The inhibitor was able to arrest the cancer cells from proliferating by elevating the levels of intracellular reactive oxygen species (ROS), which, in turn, causes DNA damage by breaking the DNA's double-strands.

The molecule also activated the cell death pathway when higher concentration was used. However, the molecule did not cause any damage to normal blood cells. "Depending on the dosage, the molecule can either kill or cause DNA damage thus arresting normal cell cycle, or allow the cells to repair the DNA double-strand breaks and revert to normal cell cycle [at lower concentrations]," said Dr. Sathees C. Raghavan at IISc.

Source: <http://www.thehindu.com>

Novel drug for blood cancer patients

A team of researchers led by Dr. Srividya Bhaskara at the University of Utah, the United States, has discovered a new drug that could alone or combined with chemo-

therapy provide better treatment for patients with blood cancer. Lymphoblastic leukemia, or ALL, is the most common form of cancer in children but also affects adults and is characterised by an overproduction of immature white blood cells, and lesser red blood cells.

Scientists have found up to 30 per cent of adult ALL patients have a Philadelphia chromosome, which are addicted to repairing DNA. Thus, they focussed on two specific proteins that were directly involved in DNA repair, called histone deacetylases (HDAC) 1 and 2 and developed a drug that inhibits their activity. The drugs broke down the central hub of DNA repair, and the HDAC 1,2 inhibitor actually reduced different repair protein functions.

In this study, when mice were treated with the HDAC 1,2 inhibitor or the combination of HDAC1,2 and doxorubicin – the chemotherapy drug – their bone marrow started turning from pale to red, indicating the white blood cells were being replaced with red blood cells. A 50-70 per cent reduction in leukemia was observed with either HDAC1,2 inhibitor alone or when the inhibitor was used with doxorubicin, a decrease that can give a patient several more years of survival.

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

Gene switch that can turn off cancer

Researchers from Karolinska Institutet, Sweden, have identified genetic switches that can be 'turned off' to stop the growth of cancer cells, an advance that paves the way for new therapies against the deadly disease. They found that cancer cells and normal cells use

different gene switches in order to regulate cell growth. The removal of a large regulatory region linked to different types of cancer caused a dramatic resistance to tumour formation, but did not affect normal cell growth in mice.

“Since we find that the growth of normal and cancer cells is driven by different gene switches, we can in principle aim at switching off the system for growth only in the cancer cells without any harmful effect on the growth of normal cells. This can lead to the development of highly specific approaches for cancer therapy with much lower toxic side effects,” said Jussi Taipale, at Karolinska Institutet.

Researchers analysed a large gene switch region that is linked to the risks of developing many different types of cancer, including prostate, breast, colon, bladder and thyroid cancers as well as chronic lymphocytic leukaemia and myeloma. The variation in this region accounts for far more cancer-related deaths than inherited mutations in well-known cancer-causing genes, researchers said.

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

Novel enzyme technology

A research team led by the Research Institute of the McGill University Health Centre (RI-MUHC), Canada, and The Hospital for Sick Children (SickKids), Canada, has developed a novel enzyme technology that prevents the formation of biofilms and can also break them down. Biofilms are slimy, glue-like membranes that are produced by microbes, like bacteria and fungi, in order to colonize surfaces.

They can grow on animal and plant tissues, and even inside the

human body on medical devices such as catheters, heart valves, or artificial hips. Biofilms protect microbes from the body’s immune system and increase their resistance to antibiotics. They represent one of the biggest threats to patients in hospital settings. Biofilm-associated infections are responsible for thousands of deaths across North America every year.

They are hard to eradicate because they secrete a matrix made of sugar molecules which form a kind of armor that acts as a physical and chemical barrier, preventing antibiotics from reaching their target sites within microbes. Scientists have discovered enzymes that cut up the sugar molecules, which glue biofilms together. The researchers found a way to use these enzymes to degrade the sugar armor, exposing the microbe to antibiotics and host defenses.

Source: <http://www.biospectrumindia.com>

Regenerating skin, hair in pigs

Biotech Company PolarityTE Inc., the United States, has successfully regenerated skin and stimulated hair growth in pigs with burns and abrasions, paving the way for a scientific breakthrough that could lead to the regeneration of fully functional human skin. PolarityTE’s patented approach to tissue engineering is designed to use a patient’s own healthy tissue to regrow human skin for the treatment of burns and wounds.

“Current approaches to treat serious burns are ‘severely limited’ in their effectiveness and in some cases, are rather expensive,” said Denver Lough, at PolarityTE. Epicel, a skin graft widely used in burn units that is sold by Cambridge, Vericel Corp, the United States, does not

result in fully thick and functional skin – which is PolarityTE’s objective. PolarityTE conducted its pre-clinical study on wounded pigs at an animal facility in Utah.

The use of therapy resulted in scar-less healing, growth of hair follicles, complete wound coverage and the progressive regeneration of all skin layers, the company said. As pig skin is more complex and robust than human skin, successful swine data is typically seen as a precursor to effectiveness in human trials. PolarityTE expects to begin a human trial later this year and the cell therapy could hit the market 12 to 18 months thereafter.

Source: <https://www.reuters.com>

3D bioprinted cartilage

Researchers from the Department of Textile Technology at the Indian Institute of Technology (IIT) Delhi have been able to achieve a measure of success in developing cartilages that are molecularly similar to the ones seen in human knees. While scientists attempting to tissue-engineer cartilage have focused on growing cells on porous scaffolds, in a paradigm shift, a team led by Dr. Sourabh Ghosh has been successful in 3D bioprinting of cartilage using a bioink.

While the cartilage found in the knee is an articular cartilage that is typically sponge-like and has a huge load-bearing capacity, the ones produced in the lab so far are of a different kind – transient cartilage. Unlike articular cartilage, transient cartilage becomes bone cells and, therefore, brittle within a short time. As a result, the engineered cartilage loses its capacity to bear huge load that is typically encountered in the knee.

Source: <http://www.thehindu.com>

Genetically modified rice

The National Institute of Plant Genome Research (NIPGR), India, has developed new genetically modified (GM) rice that can improve uptake of natural Phosphorus from the soil, cutting down the use of artificial phosphorus fertilizers. This GM rice has been produced by introducing a gene called OsPAP21b taken out from a traditional rice genotype called Dular, found in states like West Bengal, Bihar and Assam.

Supported by the Department of Biotechnology (DBT), the study showed that OsPAP21b plays important role in improving growth on organic phosphorus substrate through better phosphate uptake and utilization. Researchers found that introduction of the gene produces an enzyme, which when secreted into the soil through the roots of the rice plant helps in absorption of organic phosphorus available in the soil.

This enzyme increases organic phosphorus absorption by ~50per cent under controlled experimental conditions and hence can help reduce the cost of fertilizer use for the farmer. The team led by Dr. Jitender Giri and consisting of Ph.D. students, Poonam Mehra and Bipin K. Pandey has proposed OsPAP21b as a useful candidate for improving phosphate acquisition and utilization in rice.

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

Scientists crack tur dal code

A team of 19 scientists from the School of Agriculture and Environment and the University of Western Australia, Shenzhen Millennium Genomics, China, Professor Jayashankar Telangana State

Agricultural University, India, University of Agricultural Sciences, India, Visva-Bharati (Shantiniketan) and International Crops Research Institute for Semi-Arid Tropics (ICRISAT), India, have discovered new traits such as resistance to various diseases that affect the domesticated pigeon pea or arhar or tur dal.

“This breakthrough will help develop superior varieties of this pulse crop and help farmers increase production,” said ICRISAT. “The study used re-sequencing data to identify genomic regions impacted by domestication and breeding that have contributed to narrowing the genetic base, while also identifying the genetic origin of the crop at a DNA level for the first time,” said Rajeev K Varshney, at ICRISAT.

An ICRISAT-led global team had decoded its DNA sequence in 2011. Though a major source of protein, fiber, minerals and vitamins, pigeon pea yields have remained stagnant over the last six decades, with limited genetic diversity and genome information, required to develop better varieties. The findings have been published in the journal *Nature Genetics*.

Source: <http://www.thehindubusinessline.com>

Grapes may kill colon cancer stem cells

According to a team of researchers from Pennsylvania State University (Penn State), the United States, compounds from grapes may kill colon cancer stem cells both in a petri dish and in mice. The compounds – resveratrol – which are found in grape skins and seeds, could also eventually lead to treatments to help prevent colon

cancer, said Jairam K.P. Vanamala, at Penn State.

Colorectal cancer is the second leading cause of cancer-related deaths in the U.S., according to the American Cancer Society. “The combination of resveratrol and grape seed extract is very effective at killing colon cancer cells. And what we’re learning is the combination of these compounds is not toxic to healthy cells,” said Vanamala. The research could pave the way for clinical testing of the compounds on human colon cancer, which is the second most common cancer in women and the third in men.

If successful, the compounds could then be used in a pill to help prevent colon cancer and lessen the recurrence of the disease in colon cancer survivors. When taken separately in low doses, resveratrol and grape seed extract are not as effective against cancer stem-cell suppression as when they are combined together. The combined effect of grape seed extract and resveratrol may offer clues as to why cultures with a plant-based diet tend to have lower colon cancer rates.

Source: <http://www.news.psu.edu>

Antibiotic resistance genes in soil microbes

Researchers from the University of Western Ontario (UWO), London, have identified novel gene products, including peptides and enzymes, that can provide resistance to classes of antibiotics used to combat a range of bacterial infections, including those that cause strep throat and chlamydia. “There are certainly, in the environment, cryptic antibiotic resistance genes that have yet to be transferred to human pathogens,” said study co-author Edward Topp, at UWO.

Researchers collected soil samples from farm plots in London, Canada, that the team had exposed to antibiotics for up to 16 years. They extracted DNA from the samples and then cloned fragments of specific sequences into a strain of *E. coli* sensitive to antibiotics. When the researchers put the altered *E. coli* in petri dishes with various antibiotics, they saw some colonies were able to grow, indicating the transfected DNA fragments conferred resistance.

Through sequencing, they identified 34 new antibiotic resistance genes. "The particularly surprising result is the discovery of a gene that encodes for an unusual small proline-rich polypeptide that confers resistance to the macrolide antibiotics, very important in human and animal medicine," said Topp. Macrolide antibiotics are used to treat strep throat and pneumonia, as well as chlamydia and syphilis. The mechanism by which the newly identified gene confers resistance to macrolide antibiotics is not yet known.

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

New antibiotic weapon against Golden Staph

Researchers from Queensland University of Technology (QUT), Australia, and biotech company HFPA, Australia, are hoping to turn a native Australian plant into a major new antibiotic after discovering the plant possesses antibacterial activity equivalent to some antibiotics currently used to treat Golden Staph infections. The research team is conducting pre-clinical testing and plans to go to clinical trials within 12 months.

"We have identified the compound within the plant – known as species 8472 – responsible for its an-

tibacterial activity. This compound has been found to be as efficient against methicillin-resistant *Staphylococcus aureus* (Golden Staph) as the current standard antibiotic treatments," said Dr. Trudi Collet, at QUT. Dr. Collet's group is working with Health Focus Products Australia Pty Ltd (HFPA) and has applied for further Australian Government funding.

"The relatively common Australian plant was not currently used for medicinal purposes and had potential. Our tests found that crude extracts from species 8472 are also effective against bacteria such as *Streptococcus pyogenes*, *Staphylococcus epidermidis*, *Pseudomonas aeruginosa*, *Bacillus cereus*, vancomycin-resistant enterococci, *Proteus* spp., *Acinetobacter baumannii* and *E. coli* which can cause serious infection and delay healing," said Dr. Collet.

Source: <https://www.qut.edu.au>

Host plants communicate warning signals

A team of scientists from the Kunming Institute of Botany (KIB), China, and the Max Planck Institute for Chemical Ecology (MPICE), Germany, has discovered that parasitic plants of the genus *Cuscuta* (dodder) not only deplete nutrients from their host plants, but also function as important "information brokers" among neighboring plants, when insects feed on host plants.

Dodder, a parasitic vine, grows rapidly, entwining and parasitizing its host plants by inserting haustoria (a special organ that only parasitic plants have and functions somewhat similarly as roots) into the host plants' stems. The dodder vines can often connect different host

plants together forming a network. If any plant in the network is attacked by herbivores, expressions of defense genes in the unattacked neighboring plants are activated.

The plants are now on alert and become more resistant to their enemies. Plants of the genus *Cuscuta* have colorful folk names, such as wizard's net, devil's guts, strangle tare or witch's hair. They are leaf- and rootless parasites and grow on their host plants without touching the soil. Their haustoria penetrate their host plants to extract water and nutrients. Dodder vines fuse their vascular systems with those of its host plants, connecting them with its network.

Source: <https://www.phys.org>

Researchers turned to landfill sites

Biologists at the Bangor University, the United Kingdom, and Liverpool University, the United Kingdom, has for the first time identified the enzymes which degrade natural materials such as paper and clothing in landfill sites. "There is a current impetus to search for new enzymes to improve biomass conversion processes. Our hypothesis is that, due to the volume of waste materials they hold, landfill sites represent a repository of unexplored biomass-degrading diversity," said James McDonald, at Bangor University.

Scientists have been searching for a number of years for the most effective enzymes which break down the cellulose and lignin within the residual natural fibres. The obvious place to search has been in the rumen of sheep and cows, who eat grasses, and the guts of also other plant eaters such as elephants and termites.

Source: <https://www.phys.org>

Agricultural Biotechnology Market Research Report 2017

This report is a proficient and detail research on latest technological advancements with market share analysis of the top players in agricultural biotechnology industry. The report provides strategic recommendations in key business segments based on the agricultural biotechnology market estimations along with growth factors and investment opportunities worldwide.

Contact: BlackBird, Aleje Jerozolimskie 65/79, 00-697 Warsaw, Poland. Tel: +48-697-285-966; E-mail: pr@satprnews.com

A Network-Based Approach to Cell Metabolism

This thesis uses a systems-level approach to study the cellular metabolism, unveiling new mechanisms and responses that were impossible to reach with traditional reductionists procedures. The results reported have a potential application in areas like metabolic engineering and disease treatment.

Single Cell Protein Production from Lignocellulosic Biomass

This book focuses on bioconversion of lignocellulosic residues into single-cell protein, which offers an alternative to conventional proteins (such as soybean meal, egg protein or meat protein in animal feed) that is not affected by the climate. It also explores the benefits and potential drawbacks of single-cell protein, with an emphasis on the economic advantages of such processes.

For the above two publications, contact: Springer (India) Private Ltd., 7th Floor, Vijaya Building, 17, Barakhamba Road, New Delhi 110 001, India. Tel: +91-11-4575-5888; E-mail: marketing.india@springer.com

Advances in Plant Physiology

This book deals with challenges of ongoing international concern over the abiotic stresses under changing climate besides vital aspects related to image-based plant phenotyping; phenomics and its application in physiological breeding; trace elements; plant functions; physiological basis of yield variation; medicinal and aromatic plants and so on.

Contact: Scientific Publisher, 5-A, New Pali Road, PO Box 91, Jodhpur (Raj.) - 342 001, India. Tel: +91-291-2433323; E-mail: info@scientificpub.com

2017

6-9 Nov Kuala Lumpur, Malaysia **PHARMA + BIO MANUFACTURING ASIA 2017**

Contact: Protamp Exhibitions Sdn Bhd No. 38-3 (2nd Floor) Jalan PJU 5/9, Dataran Sunway, Kota Damansara, 47810 Petaling Jaya Selangor, Malaysia
Tel: +603-6140-6666
Fax: +603-6140-8833
E-mail: info@protempgroup.com

16-18 Nov Bengaluru, India

Bengaluru INDIA BIO 2017

Contact: Gurunath Angadi
Mobile: +91-984-575-2203
E-mail: gurunath.angadi@mmactiv.in
Web: http://www.bengaluruindiabio.in

27-29 Dec Tokyo, Japan

5th International Conference on Agriculture and Biotechnology (ICABT 2017)

Contact: Ms. Lydia Liu
Tel: +852-3500-0137
E-mail: icabt@cbees.net
Web: http://www.icabt.org

2018

8-10 Jan Singapore

International Conference on Biomolecular Engineering (ICBE Asia 2018)

Contact: Society for Biological Engineering (SBE)
100 Mill Plain Rd 3rd Fl Danbury, CT 06811
E-mail: bio@aiche.org
Web: https://www.aiche.org

24-26 Jan Bangkok, Thailand

International Conference on Agriculture, Food and Biotechnology (ICAFB 2018)

Contact: Ms. Alice Lin (Conference Secretary)
Tel: +852-3500-0137
E-mail: icafb@cbees.net
Web: http://www.icafb.org

12-14 Mar Singapore

10th Asia Pacific Global Summit on Healthcare

Contact: Conference Series
Tel: +1-650-889-4686
E-mail: healthcareasiapacific@healthconferences.org
Web: http://www.healthcare.global-summit.com

13-18 Mar Tokyo, Japan

BIO ASIA INTERNATIONAL 2018 Healthcare

Contact: Bio (Biotechnology Industry Organization)
1201 Maryland Avenue, SW Suite 900, Washington, DC 20024 USA
Tel: +1-202-962-9200
Fax: +1-202-488-6301
E-mail: cbeckman@bio.org



BCIL BIOTECHNOLOGY CLUB

FACILITIES TO MEMBERS

- Free supply of BCIL periodicals:
 - Biotech News updates (Weekly)
 - The South Asia Biosafety Program (SABP) Newsletter (Monthly)
 - Biotech Bulletin (Bi Monthly)
 - Vatis Update on Biotechnology (Quarterly)
 - Biosafety Newsletter (Quarterly)
- Quick Updates
 - Policy Updates
 - Information on Funding Schemes
 - Technologies Available for Licensing
 - Information on Fellowships & Awards
 - Articles/Reports alerts
 - Other important announcements and developments related to biotechsector
- Advance notice and privileged participation in events organized by BCIL.

BIOTECHNOLOGY CLUB MEMBERSHIP APPLICATION FORM

Name:

Designation:

Organisation:

Address:

City: Pin: Country:

Telephone: E-mail:

CODE	CATEGORY	Annual (Rs.)	Life (Rs.)
I	Individuals	5,750	57,500
R	Research Institutions	9,200	92,000
U	Universities and Academic Institutions	9,200	92,000
C	Companies/ Organizations	11,500	115,000

(Emails will be sent to 4 registered ids in case of Institutions, Universities and Organisations)

I/We enclose a Demand Draft No.for Rs. payable to **Biotech Consortium India Limited, New Delhi** for enrolment as a Biotechnology Club member.

Please send the completed form along with payment to:

The Manager

Biotech Consortium India Limited

Anuvrat Bhawan, 5th Floor, 210, Deen Dayal Upadhyaya Marg
New Delhi 110 002, India

Application Form can be downloaded from our website: www.bcil.nic.in

The fee is inclusive of service tax

Techmonitor.net

The website for YOU to

- Network with your potential technology partners

- Explore technology and business opportunities

- Know latest technological developments in

- Biotechnology
- Waste Technology
- Non-Conventional Energy
- Food Processing
- Ozone Layer Protection

- Read articles on

- Technology Trends
- Technology Markets
- Technology Transfer

- Gain knowledge on

- Start-up venture creation
- Venture financing
- Innovation management
- Technology transfer
- Green productivity

www.techmonitor.net

Website managed by

Value Added Technology Information Service
Asian and Pacific Centre for Transfer of Technology
New Delhi, India