

Apprise yourself with the latest technological innovations

Highlights

- Platform for multi-centre clinical trials
- Pact to produce chickenpox vaccine
- New test to predict Alzheimer's risk
- Quicker way to test for Zika virus
- Breakthrough in treating brain cancer
- Ants disrupt pollination in pumpkin



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

Researchers have identified small DNA 'signposts' that direct the silencing of genetic activity, allowing plants to move through different stages of development.

(Credit: University of Pennsylvania, USA)

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Platform for multi-centre clinical trials

The National Cancer Centre Singapore (NCCS), Chinese University of Hong Kong (CUHK) and Seoul National University Hospital (SNUH), Republic of Korea, have jointly launched the Asian Thoracic Oncology Research Group (ATORG), a central co-ordination platform for multi-centre clinical trials and translational research for thoracic malignancies in Asia. ATORG's will be based in Singapore to design cutting-edge clinical studies that leverage each institution's capabilities, and conduct proof-of-concept trials relevant to the treatment of thoracic cancers.

The agenda and clinical studies will be guided by a Scientific Committee comprising of representation from NCCS, CUHK, SNUH, National Taiwan University (NTU), National University Hospital (NUH), Singapore, University of Sydney, Australia, and Mahidol University, Bangkok. "Many practice-changing studies in EGFR mutation positive NSCLC have been led out of Asia and China, given the benefit of high prevalence in this region," said Tony Mok, at CUHK.

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

New initiative in ophthalmic disease management

The Department of Biotechnology (DBT), Government of India, will soon begin research on nano-intervention in management of ophthalmic diseases aiming to advance research and provide innovations in various issues related to ophthalmic disorders. DBT's initiative to begin research on nano-intervention in management of ophthalmic diseases holds significance as nanobiotechnology

holds considerable promise to address various issues related to ophthalmic disorders such as glaucoma, diabetic retinopathy, age related macular degeneration.

It also covers other such diseases especially those affecting posterior segment of an eye. Nano enabled system and devices can find novel therapeutic solutions for crossing blood retina barrier and make sustained availability of drugs in desired therapeutic concertation in different compartments of eye. The DBT has invited proposals built upon innovative ideas in the areas of "Nano Enabled System and Devices for Ocular diseases" by undertaking studies including but not limited to the two areas.

A design and development of nano-enabled system for delivery of drugs in chronic diseases of eye for sustained delivery of drugs for chronic conditions – age related Macular Degeneration, Diabetic Retinopathy, Glaucoma; tissue specific targeting of drugs in ciliary body, trabecular network, bruch's membrane/retinal pigment epithelial complex (sealing agents); crossing blood retina barrier; non-invasive nano formulations of existing drugs; delivery of gene/s for child blindness like Leber Congenital Amaurosis and Retinitis Pigmentosa; and cell based therapy.

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

Malaysia to collaborate with India on biotech

Malaysian state of Selangor has expressed interest in collaborating with India in the fields of biotechnology, information and communications technology (ICT), life sciences, transport and logistics with a view to boost economic ties between the two countries. The issue has been discussed in a meeting between Commerce and Minister Suresh Prabhu and

Chief Minister of Selangor, Dato' Seri Mohamed Azmin Bin Ali.

The Chief Minister expressed his state's interest in collaboration with India in the fields of biotechnology, ICT, life sciences, transport and logistics. Prabhu conveyed India's interest in mutual cooperation in areas such as biotechnology, agriculture and disease control. The Chief Minister also sought support for development of regional smart cities to tap into India's expertise and talent pool in this endeavour.

Further, both the sides expressed keenness to explore commercial and investment opportunities. Prabhu urged Malaysian companies to take advantage of the investment prospects available under Make in India, Skill India and Invest India initiatives. The bilateral trade between India and Malaysia increased to USD 14.15 billion in 2016-17 from USD 12.8 billion in the previous fiscal.

Source: <http://www.zeenews.india.com>

Campaign to develop photographic biomarkers

The Biogerontology Research Foundation, the United Kingdom, has announced the launch of a crowdfunding campaign 'MouseAge', to develop and test photographic biomarkers of aging in mice in collaboration with scientists from Harvard University, the United Kingdom, University of Oxford, the United Kingdom, Youth Laboratories, Germany, and Insilico Medicine, the United States.

The project's aim is to develop novel biomarkers of aging in mice for the purposes of testing the effect of healthspan and lifespan-extending interventions. The project is live at <https://www.lifespan>.

io, a crowdfunding platform for aging research institutions that has launched several successful campaigns for SENS Research Foundation, the United States International Longevity Alliance, France, and CellAge, Scotland.

The project utilizes Insilico Medicine's novel deep learning platforms to correlate changes in physical appearance with biological and chronological age. Insilico is leading the pack in the intersection of deep learning and aging research, and is well known for its use of advances in genomics, big data analysis, and deep learning for in silico drug discovery and drug repurposing for ageing and age-related diseases.

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

Genetic study of human's genome

A huge genetic study done by researchers at Columbia University, the United States, on finding how the human genome is evolving suggests that natural selection is getting rid of harmful genetic mutations that shorten people's lives. The work analysed DNA from 215,000 people and is one of the first attempts to probe directly how humans are evolving over one or two generations.

To identify which bits of the human genome might be evolving, researchers scoured large US and UK genetic databases for mutations whose prevalence changed across different age groups. For each person, the parents' age of death was recorded as a measure of longevity, or their own age in some cases. "If a genetic variant influences survival, its frequency should change with the age of the surviving individuals," said Hakhamanesh Mostafavi, at Columbia University.

People who carry a harmful genetic variant die at a higher rate, so the variant becomes rarer in the older portion of the population. Researchers tested more than 8 million common mutations, and found two that seemed to become less prevalent with age. A variant of the *APOE* gene, which is strongly linked to Alzheimer's disease, was rarely found in women over 70. And a mutation in the *CHRNA3* gene associated with heavy smoking in men petered out in the population starting in middle age.

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

Accessing data on adverse drug reactions

The US Food and Drug Administration (FDA) has launched a new user-friendly search tool that improves access to data on adverse events associated with drug and biologic products through the FDA's Adverse Event Reporting System (FAERS). The tool is designed to make it easier for consumers, providers, and researchers to access this information.

"Tools like the FDA Adverse Event Reporting System are critical to the FDA's ability to help ensure the greatest level of transparency and help patients and providers make safe use of drug and biologic products after they are approved by the FDA," said Scott Gottlieb, at FDA. The dashboard enables users to search and organize data by criteria such as drug/biological product, age of the patient, type and year of adverse event, or within a specific timeframe.

In addition to making it easier for consumers to search for adverse events reported with drug or biologic products, the FDA hopes the increased transparency will spur the submission of more detailed

and complete reports from consumers, health care professionals and others, by making it easier for people to see other reports that the FDA receives, and search the database for similar observations.

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

Biosafety permit application in Philippines

After a rigorous scientific testing and extensive research trials amid opposition by anti-GMO (genetically modified organism) groups, 'Golden Rice (GR2E)' is moving closer to the marketplace in the Philippines. If an application for a biosafety permit is approved, the much-awaited vitamin A-enriched rice variety may ultimately address the health problems associated with vitamin A deficiency.

Based on documents submitted by PhilRice and International Rice Research Institute (IRRI), the Philippines, GR2E was developed using recombinant-DNA techniques (a method of genetic engineering) to increase the amount of pro-vitamin A (mainly beta-carotene) in the rice endosperm, which is then converted in the body to vitamin A.

In 2006, IRRI and its partners began working with a new version of the GR2E trait that produces significantly more beta-carotene than the 1999 prototype, and it is this version of GR2E that is still under development and evaluation. "GR2E can be commercially released as a complementary food-based approach to existing vitamin A deficiency interventions only after passing all required tests and regulations and shown to improve vitamin A status," said IRRI.

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

Sri Lanka to draft bio safety bill

Sri Lanka will draft a 'Bio Safety Bill' to minimize damage caused to biodiversity by the release of organisms created by gene technology. Sri Lanka is a member of the Cartagena Protocol on Bio-safety, hence, legal provisions should be introduced to minimize the risk caused by use, promotion, sale, use in commercial activities, transport, import, export, re-export, transfer, disposal and release of such organism. The proposal made by President Maithripala Sirisena, in his capacity as the Minister of Mahaweli Development and Environment, to draft a new act has been approved by the Cabinet of Ministers.

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

Korean labeling law on GM food

The Republic of Korean government's new rules on genetically modified organism (GMO) labeling on products which will go into effect [February 4] is raising concerns about consumer rights. First, the new regulation will require all food companies using processed GMO crops to mention that on the product labels. But it will allow an exception which will cover pretty much all cooking oil, soy sauce and corn syrup makers.

According to the ministry, food companies can now label products with crops that are grown naturally as "non-GMO." But it will not apply to all crops, only six crops which have GMO versions — corn, soybeans, sugar beets, rapeseed, alfalfa and cotton. Rice, for example, is not applicable to this rule because the Korean market has no GMO rice. Talks on GMOs began

in Korea in 1999 when authorities found GMO soybeans were made into tofu and widely sold.

Source: <https://geneticliteracyproject.org>

Philippines top grower of GM crops in SEA

Philippines 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) has revealed. 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, 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 hectareage 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.

According to the report, the farm level economic benefit of planting biotech or GM corn in the country from 2003 to 2015 is estimated to have reached \$642 million, and for 2015 alone, the net national impact of biotech or GM crop on farm income was estimated at \$82 million. Average landholding of Filipino Biotech farmers is at two hectares. The corn producing areas in the country are Isabela, Cagayan Valley, South and North Cotabato, Sarangani and Sultan

Kudarat, among others. Davao City is also producing corn but only minimal.

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

China approves new GMO crops

China plans to import two new varieties of genetically modified crops from the United States, as it accelerates a review of biotech products as part of its broader efforts to promote economic and trade ties with the US. The approvals came right after China finalized detailed protocols on imports of US beef. The outcome was arrived at due to the two nations' willingness over the past several months to enforce their 100-day action plan agreed by their top leaders, with a goal to establish a comprehensive economic dialogue.

In May, China pledged to speed up checks of eight US varieties of GMO crops under the bilateral trade deal. Two of them received approval from China's Ministry of Agriculture, said the ministry in a statement. The ministry gave permits to two US-based agriculture companies—Monsanto Co and Dow AgroSciences LLC—to ship their soybeans and corn to China from June 12. The ministry said it also renewed import approvals for 14 other GMO crops.

In China, foreign companies must obtain safety certificates issued by the Ministry of Agriculture, in order to export GMO crops to the market. Testing, production and marketing are subject to government approval. Under the 100-day plan, imported crops will only be used as raw materials, and none are permitted to be grown in China, according to Wu Kongming, vice-president of Chinese Academy of Agricultural Sciences.

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

Transfer of technologies of drugs production

The National Immunobiological Company (Nacimbio), part of Rostec state corporation, Russia, has signed an agreement on the transfer of technology for the production of ready-made dosage forms and active pharmaceutical substances with the pharmaceutical company, India, part of a global company Mylan NV, the United States.

Within the framework of the license agreement, there will be transfer of technology for the production of both ready-made forms and active pharmaceutical substances for the creation of modern combined drugs for the treatment of HIV infection. At the same time, the corporation is ready for a technological partnership in the pharmaceutical industry.

“We are developing our own drug production, jointly with well-known foreign pharmaceutical companies, who are ready to localize production of their products in Russia. “We are starting cooperation with Mylan NV. This will provide us with the supply of substances, transfer of technology and the creation of modern combination drugs for HIV treatment. As a result, their cost in the Russian market will significantly decrease,” said Sergei Chemezov, at Rostec.

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

Collaboration to scale up biotech research

The Department of Biotechnology (DBT), Govt. of India, has announced the expansion of its first joint international laboratory with National Institute of Advanced Industrial Science & Technology (AIST), Japan, named as DBT-AIST International Laboratory for Advanced Biomedicine (DAILAB) to DAICENTER by signing a contract

on September 13, 2017 in New Delhi.

DAICENTER expands the scope of the collaboration to focused research activities with several institutions in India and other Asian countries like Sri-Lanka, Indonesia, Thailand at a Mission mode. It will also provide a platform for translation of research of leads emerging from the bi-lateral co-operations in collaboration with the Industry and opportunity for training of young scientists.

It will involve continued research, training and innovative networking programs enrolling DAILAB@AIST and its Six SISTERS (Satellite International Institutes for Special Training Education and Research). DAICENTER will focus to connect academia to industry and network innovation to entrepreneurship promoting S&T relationship of the two countries.

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

Pact to produce chickenpox vaccine

Drug firm Cadila Healthcare, India, has signed a technology agreement with Pharm Aid Ltd., Russia, for production of varicella vaccine used to prevent virus causing chickenpox. Through this agreement, Zydus Cadila (group firm) gains access to public and private market segments in the Russian Federation, Belarus, Uzbekistan, Kazakhstan, Armenia and Kyrgyzstan. The agreement will bring together local manufacturing, distribution and managerial capabilities of the companies.

The company said that it aims to bring in a continuous supply of vaccines which could be included in the critical childhood immunization programme. The estimated demand for vaccines is 3 million doses per annum in the Russian Federation alone. Pharm Aid Ltd., a joint venture between Russian National Immunobiological Company

(Nacimbio) and Ishvan Pharmaceutical, UAE, has been set up for localisation of vaccine production in Russia.

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

Cheaper TB diagnostic test to launch soon

The Indian Council of Medical Research (ICMR) is entering the final leg of performance validation and operational feasibility testing of cheaper, locally developed molecular diagnostic test, Truenat MTB, for drug-sensitive and rifampicin-resistant TB. Truenat is developed by the Molbio Diagnostics, India. The company was provided with technical assistance and resources by the Foundation for Innovative New Diagnostics (FIND) to help commercialise Truenat MTB.

ICMR plans to take the test to Public Health Centres, which currently use smear samples to test for TB, with a sensitivity level of only 50%, which is about half of what the newer method has achieved. The diagnostic tool uses sputum samples for diagnosing TB is being tested in the field in 100 designated microscopy centres in 50 districts in 10 States. The one-month study will look at nearly 18,000 samples and the results are expected next month.

The diagnostic tool has already been installed in 80% of designated microscopy centres for testing. Validation study carried by ICMR at four sites in India tested nearly 5,000 samples from 2,500 patients. The samples were also tested for resistance to the drug rifampicin and the results have been encouraging. Based on the results of a preliminary test carried out on 191 patient samples in 2013, the sensitivity of Truenat MTB was found to be over 91% and the specificity was 100%.

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

New test to predict Alzheimer's risk

Researchers from the University of California, the United States, have developed a new test that combines the effects of over two dozen gene mutations – which individually lead to only a small increased risk of Alzheimer's disease and can also better predict who will suffer from dementia or cognitive decline. According to researchers, the method is better than testing only for the well-known genetic variant APOE E4.

The polygenic hazard score (PHS), a test developed by the research team that carried out the new study, provides risk estimates for the remaining 85 to 90 percent of people who do not carry at least one copy of APOE E4 but still have some combination of other genetic variants that put them at risk of Alzheimer's. The research was published in the journal *Annals of Neurology*.

The researchers looked at five years of data on 1,081 subjects who did not have dementia, and found the PHS test could predict how long it would take for them to progress to Alzheimer's dementia, as well as how steep their cognitive decline would be, even after taking into account whether they were carriers of APOE E4. Autopsies of those who did develop Alzheimer's showed that, even among those who did not carry a copy of the APOE E4 variant, a higher PHS was associated with a higher level of amyloid plaque.

Source: <https://www.timesofindia.indiatimes.com>

New genetic clue to peanut allergy

Researchers from the University of British Columbia, Centre for

Heart Lung Innovation, Canada, University of Calgary, Cumming School of Medicine, Canada, and McGill University, Canada, have pinpointed a new gene associated with peanut allergy, offering further evidence that genes play a role in the development of food allergies and opening the door to future research, improved diagnostics and new treatment options.

The gene, called c11orf30/EMSY (EMSY), is already known to play a role in other allergy-related conditions, such as eczema, asthma, and allergic rhinitis. This study is the first to associate the EMSY locus with food allergy, and these findings suggest that the gene plays an important role in the development of not just food allergy but also general allergic predisposition. The findings have been published in the *Journal of Allergy and Clinical Immunology*.

For the study, the researchers analyzed DNA from 850 individuals with a peanut allergy recruited from the Canadian Peanut Allergy Registry (CanPAR) and nearly 1,000 individuals without a peanut allergy. The team scanned over 7.5 million genetic markers across the DNA through a genome-wide association study (GWAS) searching for clues as to which genes might contribute to an increased risk of developing food allergies.

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

Sequencing all 24 human chromosomes

According to a study by researchers at the National Institutes of Health (NIH) and other institutions in the United States, extending noninvasive prenatal screening to all 24 human chromosomes can detect genetic disorders that

may explain miscarriage and abnormalities during pregnancy. Because of the way data have been analyzed, typical genomic tests performed during pregnancy have targeted extra copies of chromosomes 21, 18 and 13, but rarely evaluated all 24 chromosomes.

The study may ultimately improve the accuracy of these tests, including by explaining why some give false-positive results. Researchers analyzed DNA sequence data from nearly 90,000 samples of maternal plasma, the liquid portion of blood after all cells have been removed. Of these samples, 72,972 came from a U.S. cohort and 16,885 came from an Australian cohort. For each, researchers calculated a normalized chromosome denominator quality (NCDQ), which measures the likelihood that a sample has the standard two copies of each chromosome.

Those with an NCDQ of 50 or below were flagged for further evaluation. In the U.S. cohort, 328 (0.45%) samples were flagged and ultimately classified as abnormal. In the Australian cohort, 71 (0.42%) samples were deemed abnormal, 60 of which contained a rare trisomy. Trisomy 7 was observed most frequently in both study cohorts, followed by trisomies 15, 16 and 22. Pregnancy and other outcome data were available for 52 of the 60 cases of rare trisomies found in the Australian cohort.

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

New technology to predict genetic diseases

Scientists at the Council of Scientific & Industrial Research (CSIR)-Institute of Genomics

Integrated Biology (IGIB), India, have developed a unique DNA-based technology GOMED (Genomics and other Omics technologies for Enabling Medical Decision). It can help clinicians to identify various genetic diseases such as Turner syndrome and Gaucher's disease that an individual is suspected to get in future.

In fact, the GOMED is already widely sought after by clinicians and over the short span of one year has been able to provide accessible genetic testing for over 500 patients who otherwise could not have afforded the costly tests. The CSIR-IGIB, under the Union Science and Technology Ministry, which has developed the technology, is in talks with various diagnostic laboratories like Path Labs and others to launch it on commercial basis and make it available to a common man.

"The present portfolio includes tests spanning over 80 genes and screening for mitochondrial disorders and is continuously updated. Presently, the IGIB is offering the genetic analysis services to its network of clinicians for the benefit of patients," said Dr. Anurag Agarwal, at IGIB. The programme is funded through the Fast-Track Translation (FTT) programme of CSIR. It has been estimated that genetic diseases affect over 70 million Indians and a total of over 300 million worldwide.

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

CRISPR hyper-accurate gene editor

Investigators at the University of California, Berkeley, and Massachusetts General Hospital, the United States, have identified a key region within the Cas9 protein that governs how accurately CRISPR/Cas9 homes in on a target DNA sequence, and have tweaked

it to produce a hyper-accurate gene editor with the lowest level of off-target cutting to date. The research team identified a protein domain, called REC3, that acts as a master controller of DNA cutting – an obvious target for re-engineering to improve accuracy even further.

This approach should help scientists customize variants of Cas9 – the protein that binds and cuts DNA – to minimize the chance that CRISPR/Cas9 will edit DNA at the wrong place, a key consideration when doing gene therapy in humans. In the current study, the researchers used a technique called single-molecule FRET (Förster resonance energy transfer) to precisely measure how the various protein domains in the Cas9-sgRNA protein complex – in particular, REC3, REC2, and HNH – move when the complex binds to DNA.

"Using single-molecule Förster resonance energy transfer (smFRET) experiments, we show that both SpCas9-HF1 and eSpCas9(1.1) are trapped in an inactive state when bound to mismatched targets," said the authors. Specifically, the scientists determined that the specificity benefits conferred by eSpCas9(1.1) and SpCas9-HF1 could be explained by the fact that the threshold for the HNH conformational switch was much higher for these Cas9 variants. Findings from the new study have been published in the journal *Nature*.

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

New toolkit combines genomics in patient care

A new website launched by the National Human Genome Research Institute (NHGRI), the

United States, has provided access to an online toolkit with more than 100 resources to nurses and other health professionals looking to integrate genomics into patient care. Developed with input from clinical educators and administrators, The Method for Introducing a New Competency in Genomics (MINC) website provides resources for nursing leaders at all levels of genomics competency, ranging from basic knowledge about genomics to its practical impact on healthcare systems and policies.

The website addresses the need for healthcare professionals to stay abreast with the rapidly changing healthcare environment. Its resources can help practicing nurses care for patients undergoing genomic testing and treatments, build awareness in their communities, and understand how to prepare their workforce for emerging clinical applications. The toolkit is structured in a question and answer format, allowing users to tailor their interventions based on the resources that will work best for them in their unique clinical setting.

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

Asia Pacific Bioinformatics Network

APBioNet promotes bioinformatics in the Asia-Pacific region by producing and provisioning bioinformatics resources such as databases, software training, education and standardization guidelines.

For more information, access: <http://www.apbionet.org>

New insights on protein linked to cancer

A team of researchers led by Shweta Tyagi at the Centre for DNA Fingerprinting and Diagnostics, India, have come up with new insights into how mixed lineage leukemia (MLL) protein is closely associated with leukemia (blood cancer) in children and adults. The team found the protein plays a crucial role in cell division by regulating chromosome segregation. Their work highlights that the absence of MLL itself gives rise to genomic instability and makes the cell prone to cancer.

This study comes at a time when lot of effort is being put to find drug targets for leukemia. The study provides insights into this novel function of MLL and Tyagi is optimistic that future work from her group would help in understanding how MLL regulates chromosome division and will provide a better drug target for blood cancer then being tested now. Researchers has been looking into find out how MLL regulates cell cycle, a process intimately linked with cancer.

While undergoing cell division, all chromosomes align themselves in a straight line so that they can be divided equally into two daughter cells. To segregate, the chromosomes attach to spindle microtubules, which acts like ropes to pull the chromosomes to each end. They observe that when they knock down MLL by RNAi, chromosomes keep trying to align but do not succeed. A process, which takes less than 40 minutes in a normal cell, goes on for several hours in the absence of MLL.

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

Quicker way to test for Zika virus

A new study done by Walter Siqueira, Schulich School of Medicine & Dentistry, Western University, Canada, and a team of international researchers, now offers a new, quicker and more cost-effective way to test for the Zika virus. For the first time, researchers are using proteomics to examine proteins and peptides in saliva in order to accurately detect exposure to Zika virus. The findings of the study have been published in the *Journal of Dental Research* (JDR).

With 70 countries and territories reporting evidence of mosquito-borne Zika virus transmission, there is an increased need for a rapid and effective test for the virus. By analyzing the saliva of a pregnant mother infected with Zika and her twins – one born with microcephaly and one without – the researchers were able to 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.

Researchers 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 or not a baby will develop microcephaly.

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

Molecule study for metabolic disorders

In a study, researchers at the Medical University of South Carolina (MUSC), the United States, have reported the cell's response to unfolded or misfolded proteins as a cause, rather than a consequence, of metabolic disorders. In an article published by *Nature Structural & Molecular Biology*, the researchers identified a little-known molecule as the trigger for this response.

When improperly folded molecules are encountered in cells, the unfolded protein response (UPR) is activated within the endoplasmic reticulum (ER). The ER is in charge of molecular quality control, making sure proteins, lipids and other molecules are folded properly before the cell attempts to use them for metabolic processes. Here, a master protein called grp78 is in contact with three main signaling hubs that make up the control center of the UPR.

When an unfolded or misfolded protein is encountered by grp78, it breaks contact with those sensors and activates the UPR. The UPR then refolds or disposes of such molecules before they are shipped to the parts of the cell that need them. CNPY2 has been known for some time to reside within the ER, but its function there has remained a mystery. To start, mice without CNPY2 were generated to see how they would grow.

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

Mini-protein binders as potential drugs

Scientists from the University of Washington (UW), the United States, have created a high-speed method to generate thousands of different, small, stable proteins from scratch that can be custom-designed to bind to specific therapeutic targets. The method

used a computer platform, called Rosetta, developed by Baker and colleagues at UW. They designed thousands of short proteins, about 40 amino acids in length that the Rosetta program predicted would bind tightly to the molecular target.

Due to their small size, these short proteins tend to be extremely stable. They can be stored without refrigeration. They also are more easily administered than large protein drugs, such as monoclonal antibodies. Previously, such short, protein-binder drugs were typically re-engineered versions of naturally occurring proteins. These, however, tended not to be significantly better than monoclonal antibodies.

Because these mini-proteins binders are original designs, they can be tailored to fit their targets much more tightly and are simpler to modify and refine. In this study, the researchers sought to design two sets of these proteins: one set that would prevent the influenza virus from invading cells and another that would bind to and neutralize a deadly nerve toxin from botulism. This toxin is considered a potential bioweapon.

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

Researchers reveal the secrets of cancer

In a study scientists at the University of Georgia, the United States, have shown that a rare type of glycosylation greatly affects the function of a protein important for human development and cancer progression. The research team of Dr. Robert Haltiwanger, has studied specific O-linked modifications, i.e., the attachment of glucose or fucose to serine or threonine, a modification that affects only a few hundred different types of proteins, including one called Notch.

It's a signaling receptor critical for cell development and differentiation

and is dysregulated in cancers such as leukemia, breast cancer, and prostate cancer. The enzymes responsible for modifying Notch with glucose and fucose are called POFUT1 and POGlut1. Dr. Haltiwanger's team, led by Dr. Hideyuki Takeuchi, wanted to know exactly why POFUT1 and POGlut1 were attaching glucose and fucose to Notch in cells.

The finding of the study has been published in the *Journal of Biological Chemistry*. "Here we demonstrate that cell-surface expression of endogenous Notch1 in HEK293T cells is dependent on the presence of POGlut1 and POFUT1 in an additive manner. In vitro unfolding assays reveal that addition of O-glucose or O-fucose stabilizes a single EGF repeat, and that addition of both O-glucose and O-fucose enhances stability in an additive manner," wrote the investigators.

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

Protein offers insight into foot-and-mouth virus

Scientists at the University of Leeds, the United Kingdom, and The Pirbright Institute, the United Kingdom, have identified that a tiny protein, which plays a major role in the replication of foot-and-mouth disease virus, demonstrates a greater level of genetic economy than previously reported. "Sometimes it's the little things that can make the big differences.

By understanding the role of this tiny viral protein in the replication of foot-and-mouth disease virus, we're hoping to find more effective vaccines that fight the disease," said lead researcher Nicola Stonehouse, at the University of Leeds.

Researchers identified a new role for a small viral protein – called 3B3 – revealing how these viruses can copy themselves efficiently.

Foot-and-mouth disease is of great economic importance and their findings could lead to the development of more effective vaccines against the disease in the future.

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

Scientists study space conditions in cosmonauts

A team of scientists from Russia and Canada has analyzed the effect of space conditions on the protein composition in blood samples of 18 Russian cosmonauts. The results indicated many significant changes in the human body caused by space flight. These changes are intended to help the body adapt and take place in all the major types of human cells, tissues, and organs. Skoltech and MIPT Professor Evgeny Nikolaev initiated this research.

The effects of spaceflight on the human body have been studied actively since the mid-20th century. It is widely known that space conditions influence metabolism, thermoregulation, heart biorhythms, muscle tonus, the respiration system and other physiological aspects of the human body function. However, the molecular mechanisms which drive the physiological changes caused by space flights remain unknown.

Proteins are key players in the adaptive processes in an organism, so the scientists decided to focus on them. To gain a deeper understanding of the changes in human physiology during space travel, the research team quantified concentrations of 125 proteins in the blood plasma of 18 Russian cosmonauts who had been on long-duration missions to the International Space Station. The results have been published in the scientific journal *Nature Scientific Reports*.

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

New drug against non-severe malaria

A new drug developed by researchers at Tulane University, the United States, is effective in treating non-severe cases of malaria. This comes as a significant development as public health experts warn that *Plasmodium falciparum*, the parasite responsible for most malaria cases, is developing resistance to widely used treatments. New medications are needed to build up secondary defenses against drug-resistant strains of the parasite.

The new drug, called AQ-13, was able to clear the parasite responsible for the disease within a week, matching the effectiveness of the most widely used treatment regimen. "The results of the clinical trial, which was supervised by the US Food and Drug Administration (FDA), are extraordinarily encouraging," said Dr. Donald Krogstad, at Tulane University. Researchers recruited 66 adult men in Mali with uncomplicated malaria, which is defined as malaria that isn't life threatening.

Half were treated with AQ-13 and the other half received artemether and lumefantrine. Both drug groups had similar cure rates. However, 5 participants in AQ-13 group left the study or were lost to follow-up and 2 participants in the artemether/lumefantrine group had late treatment failures with recurrence of their original infections. Researchers hope to expand testing of the drug to more participants, including women and children, before it can be widely recommended as a new treatment.

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

Scientists connect liver cancer with Hepatitis B

Scientists at the University of Hong Kong (HKU), China, have found that hepatitis B treatment reduces the incidence of liver cancer. Hepatitis B is a common infectious disease caused by the hepatitis B virus (HBV). Hepatitis B can be transmitted through blood and body fluids, through sexual contact, the transfusion of contaminated blood and the sharing of contaminated needles.

The incubation period of HBV ranges from 45 to 160 days. In Hong Kong, approximately 8% of the population are infected with HBV. If not detected early, patients who are infected with HBV will become chronic carriers of the virus. In this study, the research team at HKU obtained 14-year HBV treatment data in specialist outpatient clinics from the Hospital Authority.

The team statistically studied the effect of HBV treatment on liver cancer trends from 1990 to 2012 and confirmed that HBV treatment is associated with a reduction in overall liver cancer incidence. The team also studied the effect of treatment in specific age groups. The HKU study confirms the effectiveness of HBV treatment in reducing the burden of liver cancer.

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

Breakthrough in treating brain cancer

Researchers at Duke University, the United States, have produced compelling research that shows a patient's own immune system can be used to attack brain cancer

cells. The latest research confirms results Duke's scientists have previously reported in experimental trials with brain cancer patients. Some patients have experienced dramatic shrinkage of brain tumors and remission of their cancer.

Brain tumors are among the most aggressive forms of cancer with low survival rates; historically patients have been treated with surgery, radiation and chemotherapy. "If the results are further confirmed by additional tests and studies, they could ultimately lead to the development of therapies that could turn many forms of cancer into a manageable condition, like diabetes or HIV," said Matthias Gromeier, at Duke.

Duke's researchers are deploying a polio virus that's genetically modified not to harm patients but naturally infects cancerous growths. The virus identifies the tumors for the patient's immune system, and activates the immune system to launch an attack. The modified polio virus, developed by Gromeier in 1994, received breakthrough therapy designation from the U.S. Food and Drug Administration (FDA) last year.

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

Silk-based wearable body sensors

Scientists from the Tsinghua University, China, have reported that they are using silk to develop a more sensitive and flexible generation of these multi-purpose devices that monitor a slew of body functions in real time. "There is a whole world of possibilities for silk sensors at the moment. Silk is the ideal material for fabricating sensors that are worn on the body," said researcher Dr. Yingying Zhang.

Silk, a natural fibre that is stronger than steel and more flexible than nylon, could overcome these problems. As one of the most coveted fabrics in the world, the material is also lightweight and biocompatible. "One possibility we foresee is for them to be used as an integrated wireless system that would allow doctors to more easily monitor patients remotely so that they can respond to their medical needs more rapidly than ever before," said Zhang.

However, the fibre doesn't conduct electricity very well. To address this challenge, researchers sought to find a way to boost the conductivity of silk so it could be successfully used in body-sensing devices. The researchers decided to try two diverse strategies. In one method, they treated the silk in an inert gas environment with temperatures ranging from 1,112 °F to 5,432 °F. Consequently, the silk became infused with N-doped carbon with some graphitized particles, which is electrically conductive.

Source: <http://www.china.org.cn>

New stem cell therapy

Researchers at Allele Biotechnology and Pharmaceuticals, the United States, headed by Dr. Jiwu Wang, has persisted in finding what they believe to be the best, safest and most ethical way of administering stem cell therapy beginning with one's own skin cells. "To have pluripotent stem cells means having a source of cells capable of changing into any type of cell like the lung cells, liver cells neurons, pancreatic beta cells, and so on," explained Dr. Wang.

From there, Allele's discovered a more efficient way to reprogram

cells since research began in 2009, a process which has since been able to file for multiple patents. Due to its promising results, the research has received funding from the federal government, which has long been very careful in providing assistance to stem cell therapy related research, precisely for the many controversies its kind has raised through the years.

Best of all, Allele's stem cell therapy is already in the process of generating personalized stem cells under the high standard termed current Good Manufacture Practice, or cGMP, defined by the US Food and Drug Administration (FDA) aimed for application in clinical cell therapy just as they began banking cells from patients in their San Diego laboratories.

Source: <http://www.manilatimes.net>

Silkworm micro cocoons for medicine

Researchers at the University of Cambridge, the United Kingdom, have helped to make microscopic versions of the cocoons spun by silkworms to store sensitive proteins technology which could be used in pharmaceuticals to treat a range of debilitating illnesses. The tiny capsules, which are invisible to the naked eye, can protect sensitive molecular materials and could prove a significant technology in areas including food science, biotechnology and medicine.

The capsules were made with help from engineers from the University of Sheffield, the United Kingdom, using a specially-developed microengineering process that combines the power of microfluidic manufacturing with the value of natural silk. The process

mimics on the microscale the way in which *Bombyx mori* silkworms spin the cocoons from which natural silk is harvested. The capsules comprise a solid and tough shell of silk nano-fibrils that protects a centre of liquid cargo, and are more than a thousand times smaller than those created by silkworms.

The team suggests that these 'micrococoons' are a potential solution to a common technological problem: how to protect sensitive molecules that have potential health or nutritional benefits, but can easily degrade and lose these favourable qualities during storage or processing. The study argues that sealing such molecules in a protective layer of silk could be the answer, and that silk micrococoons that are far too small to see (or taste) could be used to house tiny particles of beneficial molecular "cargo" in products like cosmetics and food.

Source: <http://www.health.economic-times.indiatimes.com>

New way to kill cancer cells

A team of researchers at Fudan University, China, have discovered that a traditional plant-based Chinese ink called Hu-Kaiwen ink contains distinctive molecular properties that aren't just suited to inscribing messages on paper – they're also ideal for killing cancer cells. Researchers began looking into Hu-Kaiwen ink (aka Hu-ink) after noticing its similarities to artificial nanomaterials used in an emerging cancer treatment called photothermal therapy (PTT).

PTT involves injecting substances containing these nanomaterials into tumours in the body, which are then targeted by a laser. Once the laser hits the nanomaterial package

deployed in the cancer cells, the cells heat up and die. A number of artificial nanomaterials have been investigated by researchers looking into PTT – including engineered carbon nanotubes and graphene – but have been found to be either toxic, expensive to produce, or difficult to make.

But the slick, black consistency of Hu-Kaiwen ink looked like it might tick all the boxes scientists are looking for in a PTT candidate: the right colour for absorbing light and heat, stable in water, not prohibitively expensive or complex, and – importantly – not toxic to the body. For testing, the researchers analysed the ink in an aqueous dispersion and found it consisted of aggregates of small carbon nanoparticles, which could heat up to 55 °C (131 °F) after just 5 minutes of near-infrared irradiation – greater thermal absorption than most artificial PTT materials.

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

Medical “pen” identifies cancerous tissue

According to scientists at the University of Texas, the United States, a new handheld medical device can identify cancer in tissue in just 10 seconds, which could make surgery to remove a tumor quicker, safer and more precise. Tests suggest that the medical “pen”, called MasSpec Pen, is accurate 96% of the time. It takes advantage of the unique metabolism of cancer cells.

Their furious drive to grow and spread means their internal chemistry is very different to that of healthy tissue. The pen is touched on to a suspected cancer and releases a tiny droplet of water. Chemicals

inside the living cells move into the droplet, which is then sucked back up the pen for analysis.

The pen is plugged into a mass spectrometer – a piece of kit that can measure the mass of thousands of chemicals every second. It produces a chemical fingerprint that tells doctors whether they are looking at healthy tissue or cancer. The challenge for surgeons is finding the border between the cancer and normal tissue.

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

Medical camera to see through body

A team at University of Edinburgh, the United Kingdom, led by Indian-origin scientist Kev Dhaliwal, has created a medical camera that can see through the human body, and he believes it has immense potential for doctors in tracking internal examinations. Dhaliwal believes that with this device doctors will no longer be required to exclusively rely on expensive scans and X-rays.

“It has immense potential for diverse applications, such as the one described in this work. The ability to see a device’s location is crucial for many applications in healthcare, as we move forwards with minimally invasive approaches to treating disease,” said Dhaliwal. The camera is designed to help doctors track medical tools, known as endoscopes, that are used to investigate a range of internal conditions.

The new device is able to detect sources of light inside the body, such as the illuminated tip of the endoscope’s long flexible tube. The new camera takes advantage of advanced technology that can detect individual particles of

light, called photons, the team explained. Experts have integrated thousands of single photon detectors onto a silicon chip, similar to that found in a digital camera.

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

Novel antifungal molecule

A research group led by Dr. Gopaljee Jha at the National Institute of Plant Genome Research (NIPGR), India, has identified a novel broad spectrum antifungal protein. The breakthrough was heralded by the team when they isolated a novel bacterium *Burkholderia gladioli* strain NGJ1 from healthy rice seedling which exhibits broad spectrum fungal eating property (the phenomenon known as mycophagy). The results have been published in the journal *Nature communications*.

The researchers observed that bacterium were killing fungal cells to utilize their metabolites for its own growth and survival. They tested the purified Bg_9562 protein to check the broad spectrum antifungal activity. Strikingly, the antifungal activity was observed against several economically important phytopathogens, such as *Rhizoctonia solani* (rice sheath blight pathogen), *Magnaportheoryzae* (rice blast pathogen), *Fusarium oxysporum* (pathogenic to various plants), *Aschocyta rabiei* (chickpea blight pathogen), *Venturiainaequalis* (apple scab pathogen) and *Candida albicans* (causes Candidiasis in humans).

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

Biosafety Clearing-House

<https://bch.cbd.int>

Study reveals heat tolerance traits in peas

A new study done by University of Saskatchewan, Canada, has indicated that pea plants with some specific traits – such as longer flowering time and higher pod numbers – may be more resistant to heat stress. The researchers also gained new insights into the genetics of heat tolerance in pea. “In some years, the older varieties of pea weren’t growing very well because of heat stress,” said Rosalind Bueckert.

According to Bueckert, tolerance to heat stress in peas seems to be dependent on quite a few traits. The study found that two traits, however, are most important: higher pod numbers and longer flowering duration. Bueckert and her colleagues Tom Warkentin and Shaoming Huang are the first to uncover the location of genes that affect heat stress.

To determine which traits are important for heat resistance in peas, Bueckert and her colleagues crossed two commonly used varieties of pea, CDC Centennial and CDC Sage. Then the researchers evaluated more than a hundred new varieties of pea derived from this cross. “By crossing two different varieties of pea, you may be able to breed offspring with traits beyond those of either parent,” said Bueckert.

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

Artificial leaf creates fuel from sunlight

Scientists at the Council of Scientific and Industrial Research (CSIR)-National Chemical Laboratory, India, have developed an artificial leaf that absorbs sunlight to generate hydrogen fuel from water, an advance that may provide clean energy for powering eco-friendly cars in the future. The ultra-thin wireless device mimics

plant leaves to produce energy using water and sunlight.

“It is known that hydrogen generation from renewable resources will be the ultimate solution to our energy and environment problems,” said Chinnakonda S Gopinath, at CSIR. Gopinath said that his team had been working in the area of water splitting to generate hydrogen for nearly a decade. Hydrogen burning gives energy and water as a side product, underscoring its importance and relevance to the present day world.

The device consists of semiconductors stacked in a manner to simulate the natural leaf system. When visible light strikes the semiconductors, electrons move in one direction, producing electric current. The current almost instantaneously splits water into hydrogen – which researchers believe is one of the cleanest forms of fuel as its main byproduct is water. The research has been published in the *Scientific Reports*.

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

Scientists decode the genome of bajra

A global team of 65 scientists from 30 research institutions, have decoded the genome of bajra and discovered how the crop survives high temperatures and drought, a finding that may help boost production of other cereals in light of the impending global climate change and food crisis. Rising temperatures and frequency of extreme climate events like heat waves in many parts of the world will lead to a drop in major staple crop production.

Scientists decoded and sequenced the bajra (or pearl millet) genome and revealed critical coping strategies. The analysis has led to a better understanding of the ability of this dryland cereal

to survive soaring temperatures of over 42 °C and its exceptional drought tolerance. The discovery published in the journal *Nature Biotechnology* may help develop climate adaptation strategies in other important food crops.

This research co-led by the International Crops Research Institute for Semi-Arid Tropics (ICRISAT), India, BGI-Shenzhen, China and the French National Research Institute for Sustainable Development (IRD), used the latest innovations in DNA sequencing and analysis. The team identified new genetic tools like molecular markers related to drought and heat tolerance, as well as other important traits.

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

Ants disrupt pollination in pumpkin

Scientists at the Central University of Kerala (CUK), India, have investigated why pumpkin pollinators were failing. Pumpkin plants produce separate male and female flowers. Watching pollinators visit 128 female and 112 flowers across 18 pumpkin patches, the team found that honey bees – the main pollinators of pumpkin here – visited female flowers more than they did male ones.

“That’s because female flowers produce a better quantity and quality of nectar,” Sinu P. A., at CUK. To check if the presence of ants deter bees, disrupting pollination and in turn fruit set, the team identified 76 mature female flower buds and covered them with nylon mesh bags to exclude crazy ants. When the flowers bloomed the next day, the scientists removed the bags to permit bees to visit these ‘ant-less’ flowers for 15 minutes.

They then re-bagged the flowers to prevent ants from getting to them and observed these flowers,

found that three-quarters of them set fruit. The team also quantified bee-visits on 80 ant-infested flowers. Such flowers received lesser bee visits and the ants even killed a few bees that landed on them. None of these flowers set fruit.

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

New plant based vaccine against polio virus

In a breakthrough, scientists from independent research organisation John Innes Centre (JIC), the United Kingdom, have used plants to produce a new vaccine against the polio virus, a finding which can pave the way for global eradication of the disease. The novel vaccine was produced with a method that uses virus-like particles (VLPs) – non-pathogenic mimics of the polio virus which are grown in plants.

Genes that carry information to produce VLPs are infiltrated into the plant tissues. The host plant then reproduces large quantities of them using its own protein expression mechanisms. “This is an incredible collaboration involving plant science, animal virology and structural biology. The question for us now is how to scale it up – we don’t want to stop at a lab technique,” said George Lomonosoff, at JIC.

Laboratory tests demonstrated that the polio virus mimics provided animals with immunity from the disease paving the way for human vaccines to be produced by plants on a major scale with the input of pharmaceutical industry collaborators. According to the researchers, the successful development of VLPs not only holds promise for the production of vaccines for polio but it could also become a frontline diagnostic resource in producing vaccines against other viral outbreaks.

Source: <http://www.health.economic-times.indiatimes.com>

Bacteria that can devour fungi

Scientists from National Institute of Plant Genome Research (NIPGR), India, have identified an antifungal bacterium that can destroy fungal infections by eating them up. The capability of devouring the fungi, leaving no remnants of the infection could make these bacteria a more effective antifungal agent than the ones currently available. Furthermore, the group has also identified a bacterial protein, which is essential for eating fungi.

It opens up various possibilities ranging from using the bacterium or the protein for antifungal sprays over fields or utilizing it as transgene to develop broad spectrum fungal disease resistant plants. A team led by Dr. Gopaljee Jha from NIPGR, had isolated the bacterium *Burkholderia gladioli* strain NGJ1 from healthy rice seedling. In their study, the group has shown that the bacteria can eat up broad spectrum of fungi, a property technically called mycophagy.

The discovery was an accidental one en route to the team’s endeavour to try and understand the molecular intricacies of the bacteria *Rhizoctonia solani*, which causes sheath blight disease, a significant fungal disease of rice. While establishing detached bioassay to study the pathogenesis of *R. solani* on laboratory media plates, the group observed that whenever a particular yellow coloured bacterium ooze out from rice, the growth of *R. solani* was prevented.

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

New research in plant’s heat tolerance

Research scientists at Texas A&M AgriLife, the United States, have discovered a ribonucleic acid (RNA), that can increase the thale cress plant’s resistance

to stress from drought and salt. “The discovery could help illuminate a new pathway to engineering drought- and salt-tolerant plants, including food crops,” said Dr. Liming Xiong, at AgriLife.

The lncRNA his team discovered in thale cress plants existed in low numbers under non-stress conditions, but levels increased when the plants encountered drought or salt stress. Manually increasing the level of the lncRNA showed corresponding increases in drought and salt tolerance compared with plants where the lncRNA level was unaltered.

Most RNA direct or “code” cell machinery to produce proteins. Non-coding RNA, or ncRNA, does not direct protein production but could affect how gene expressions manifest in innumerable other ways. As such, they are considered regulators of important biological processes. The basic difference between small and long non-coding RNA is the number of nucleotides – the structural building blocks of RNA. Long have more.

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

Genetically modified rice stacked with antioxidants

Researchers in China have developed a genetic engineering approach to make purple rice that produces high levels of antioxidants. Their work is published in the journal Molecular Plant. Rice is a staple food in Asia, making it a good agent for delivering micronutrients that are beneficial to health. However, not all micronutrients are produced in large quantities by rice. To date, genetic engineering approaches have been used to develop rice enriched in beta-carotene and folate (precursors of vitamins A and B), but not anthocyanins. Anthocyanins are natural antioxidants that have the potential

to decrease the risk of certain cancers, cardiovascular disease, diabetes, and other chronic disorders. Although these health-promoting compounds are naturally abundant in some black and red rice varieties, they are absent in polished rice grains because the husk, bran and germ have been removed, leaving only the endosperm—the fleshy part at the center of the grain.

In this study, researchers developed a method to deliver many genes at once and used it to make rice endosperm produce high levels of anthocyanins. Previous attempts to engineer anthocyanin production in rice have failed because the underlying biosynthesis pathway is highly complex and it has been difficult to efficiently transfer many genes into plants. To address this challenge, Professor Liu Yao-Guang and his colleagues at the South China Agricultural University first set out to identify the genes required to engineer anthocyanin production in the rice endosperm. To do so, they analyzed sequences of anthocyanin pathway genes in different rice varieties and pinpointed the defective genes in japonica and indica subspecies that do not produce anthocyanins. Based on this analysis, they developed a transgene stacking strategy for expressing eight anthocyanin pathway genes specifically in the endosperm of the japonica and indica rice varieties. The resulting purple endosperm rice had high anthocyanin levels and antioxidant activity in the endosperm.

“We have developed a highly efficient, easy-to-use transgene stacking system called TransGene Stacking II that enables the assembly of a large number of genes in single vectors for plant transformation,” said Liu. “This is the first demonstration of engineering such a complex metabolic pathway in plants. We envisage that this vector system will have many potential applications in this era of synthetic biology and metabolic engineering.”

In the future, this transgene stacking vector system could be used to develop plant bioreactors for the production of many other important nutrients and medicinal ingredients.

The researchers plan to evaluate the safety of purple endosperm rice as biofortified food and they will also try to engineer the biosynthesis of anthocyanins in other crops to produce more purple endosperm cereals such as maize, wheat and barley.

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

GMO potatoes provide improved vitamin A

Researchers from the Ohio State University, the United States and the Italian National Agency for New Technologies have developed a “golden” potato with significantly increased levels of vitamins A and E. Findings from the new study were published recently in *PLOS ONE*. The research team found that a serving of the yellow-orange lab-engineered potato has the potential to provide as much as 42% of a child’s recommended daily intake of vitamin A and 34% of a child’s recommended intake of vitamin E. Moreover, the researchers concluded that women of reproductive age could get 15% of their recommended vitamin A and 17% of recommended vitamin E from that same 5.3-ounce (150-gram) serving.

Interestingly, the study investigators created a simulated digestive system including a virtual mouth, stomach, and small intestine to determine how much provitamin A and vitamin E could potentially be absorbed by someone who eats a golden potato. Provitamin A carotenoids are converted by enzymes into vitamin A that the body can use. Carotenoids are fat-soluble pigments that provide yellow, red and orange colors to fruits and vegetables. They are essential nutrients for animals and humans.

“We ground up boiled golden potato and mimicked the conditions of these digestive organs to determine how much of these fat-soluble nutrients became biologically available,” Dr. Failla noted. The main goal of the work was to examine provitamin A availability. The findings of the high content and availability of vitamin E in the golden potato were an unanticipated and pleasant surprise, Dr. Failla said.

The golden potato, which is not commercially available, was metabolically engineered in Italy by a team that collaborated with Dr. Failla on the study. The additional carotenoids in the tuber make it a more nutritionally dense food, with the potential of improving the health of those who rely heavily upon potatoes for nourishment. While plant scientists have had some success cross-breeding other plants for nutritional gain, the improved nutritional quality of the golden potato is only possible using metabolic engineering—the manipulation of plant genes in the lab.

“We have to keep an open mind, remembering that nutritional requirements differ in different countries and that our final goal is to provide safe, nutritious food to 8 billion people worldwide,” remarked study co-author Giovanni Giuliano, Ph.D., research director at the Italian National Agency for New Technologies, Energy, and Sustainable Development at the Casaccia Research Center in Rome. Dr. Failla agreed and added that “hidden hunger—deficiencies in micronutrients—has been a problem for decades in many developing countries because staple food crops were bred for high yield and pest resistance rather than nutritional quality. This golden potato would be a way to provide a much more nutritious food that people are eating many times a week, or even several times a day.”

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

The CRISPR/Cas System: Emerging Technology and Application

In this volume, expert international authors provide a useful and timely review of the applications of the CRISPR/Cas system across diverse fields and explore further avenues and research directions of this novel and powerful editing technology. The technology and its application are reviewed with respect to reproduction and development, immunity and genetic diseases, system structure and system specificity.

Contact: Caister Academic Press, Unit 7570, UK Postbox - Courier Point 13 Freeland Park, Wareham Road, Poole BH16 6FH, U.K.

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This is a package of nine books that compile the latest ideas from across the entire arena of biotechnology and bioengineering. This volume focuses on the underlying principles of biochemistry, microbiology, fermentation technology, and chemical engineering as interdisciplinary themes, constructing the foundation of biotechnology and bioengineering.

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For the above three publications, contact: Springer (India) Private Ltd., 7th Floor, Vijaya Building, 17, Barakhamba Road, New Delhi-110001. Tel: +91-11-45-75-58-88; E-mail: marketing.india@springer.com

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(Secretary)
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E-mail: icafeb@cbees.net
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Contact: Mr. M V Subba Rao
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Contact: Ms. Sophia Du
Conference Secretary
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 - 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

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