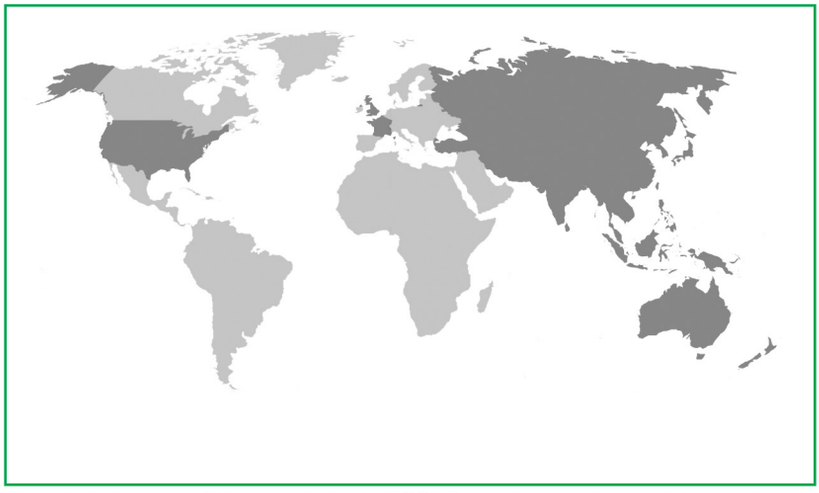
The **Asian and Pacific Centre for Transfer of Technology (APCTT)**, a subsidiary body of ESCAP, was established on 16 July 1977 with the objectives: to assist the members and associate members of ESCAP through strengthening their capabilities to develop and manage national innovation systems; develop, 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

Bioengineered salivary gland
(red: myoepithelium; green: nerve fibers)

(Credit: Professor Takashi Tsuji et al. of Tokyo University of Science and Organ Technologies Inc., Japan)

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India and Japan to launch joint research initiatives

The Ministry of Science and Technology (Department of Biotechnology (DBT), and Department of Science and Technology, DST), Govt. of India and RIKEN, Japan's largest research organization have signed Memorandum of Understandings (MoU's) for launching joint research programs in the fields of Biology, Life sciences, and material sciences. (Genome-related research including systems Biology, Computational science including development of bioinformatics tools, Detection tools (e.g. spectroscopy) for security and other areas of mutual interest). The MoU's were signed by Prof. Noyori, President of RIKEN and Dr. T. Ramasami, Secretary, DST, and Dr. K. Vijay Raghwan, Secretary, DBT. This will formally launch the RIKEN-DBT&DST joint research activities.

Dr. K. Vijay Raghwan, Secretary DBT, said this MoU will usher in a new era of cooperation in the area of innovations and techniques for the agricultural and pharmacological industries in India. Dr. T. Ramasami, Secretary DST, hoped recognizing the importance of science and technology and the high potential of further cooperation in various areas of research between the DST and RIKEN will further the scope of new inventions. The Ambassador of Japan to India, Mr. Takeshi Yagi said mutual cooperation between the two prominent Asian countries in the fields of Biology, Life Sciences, and Material Sciences is an important phenomena and such steps need further strengthening. Prof. Noyori delivered a lecture on "Science Shapes our Future". The RIKEN-DBT&DST joint research program will also focus on supporting the exchange of researchers, postdoctoral fellow and doctoral students besides doing joint research programs.

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

China to get its first national biobank

BioStorage Technologies, the United States, through its partnership with BGI-Shenzhen, will provide technical consulting services to the China National Genebank (CNGB) for the development of China's first national biobank. Established by BGI-Shenzhen and supported by the Chinese government, the CNGB is committed to developing a biobank consortium across China and an expanding worldwide network to provide better support for global data sharing and exchange of biobank best practices, including biobank construction, genomics research and data acquisition. The CNGB has a goal to store 30 million biological, animal and agricultural samples collected from research institutions, universities and hospitals in China.

"BioStorage Technologies is honored to be selected as a partner on one of the largest genomic biobanks in the world," said Mr. Greg Swanberg, CEO, BioStorage Technologies. "The CNGB is dedicated to supporting the growth of the genomics industry within China by developing the world's largest collection of biological samples to advance new and innovative research," said Dr. Yong Zhang, director, CNGB. "As the global leader in sample management, BioStorage Technologies was selected as our strategic partner based on their ability to provide technical sample management consulting, process leadership and innovative technology solutions"

Source: http://www.biospectrumasia.com

Stem cell leaders call for human embryome project

Just as an international consortium was formed to map and sequence the human genome, now a group of stem cell and regenerative medicine scientists say it's critical that such an effort be ramped up to do a similar project focused on the human embryome. This was the key message of a panel discussion, "From Mapping the Genome to Mapping the Embryome: The Urgent Need for an International Initiative," moderated by Michael West, Ph.D., CEO of Biotime, the United States. It took place at the World Stem Cell Summit, which took place in San Diego.

"It is becoming increasingly clear in regenerative medicine that pluripotent stem cells, embryonic stem cells, and IPs cells will be as fundamentally important to medicine as was DNA. Maybe even bigger because you can genetically engineer these cells," said Dr. West. "The opportunity presented by pluripotent stem cells to manufacture for the first time in the history of medicine all of the cellular components of the human body on an industrial scale is at once both an opportunity and a challenge," said Dr. West. "The opportunity is to build a new field we call regenerative medicine in which many currently incurable diseases are treated with cells capable of regenerating tissues afflicted with disease. The challenge relates to the complexity of the cell types in the body and our ability to manufacture products with precisely defined compositions for human clinical use." "If [there were] a detailed map of all the cellular and molecular components of life from the fertilized egg to adulthood, and then databased in a manner to the information in the human genome, medicine would be the true beneficiary," added Dr. West. "That's

why we have made this call for an international initiative."

Source: http://www.genengnews.com

Saudi Arabia to map hundred thousand genomes

Up to 100,000 people in Saudi Arabia are to have their genetic codes mapped over the next five years in a new human genome project. The research will look at genes linked with diseases, and pave the way for prenatal and premarital screening. The project, funded by the Saudi Arabian national science agency, will create a DNA database to develop personalized medicine. A similar UK scheme is underway to map the genomes of 100,000 NHS patients. Genome studies are moving from analyzing the personal DNA code of individuals for research purposes, to clinical applications, such as treatments tailored to the genetic makeup of cancers.

King Abdulaziz City for Science and Technology president Dr. Mohammed Bin Ibrahim Al Suwayl said: "We have clear strategy and policy of the importance of science to a knowledge-based society and we believe the Saudi human genome programme will help shape the understanding of health and disease and usher in an era of personalized medicine in the Kingdom of Saudi Arabia and we are grateful for the investment and vision of the Saudi leadership." The research will take place at 10 genome centers across Saudi Arabia, with another five genome centers to be created in coming years.

On the announcement of the project, UK genome expert Dr. Ewan Birney, associate director at the European Molecular Biology Laboratory – European Bioinformatics Institute, said "I am excited that Saudi Arabia is taking a substantial step forward in sequencing genomes in their clinical healthcare. "I hope to see broader engagement between Western countries and Middle Eastern countries in this area, and data sharing and expertise sharing in both directions."

Source: http://www.bbc.co.uk

Canada-India scientific and technological cooperation

Under the Canada-India scientific and technological cooperation, both the countries will soon begin collaborative research and development (R&D) projects in all areas of biotechnology including life sciences and medical devices. The program aims to foster and support the development of collaborative R&D projects that bring together companies, research organizations, and academics from both countries for the joint development of innovative products or processes. It aims to stimulate innovative R&D projects (engaging small-to-medium-sized companies and/or larger, well established firms) that address a specific market need or challenge; demonstrate high industrial relevance and commercial potential; and aim to deliver benefit to all participants, and more broadly, to both nations. These projects help participants to become more competitive by developing global research-based alliances with the potential to foster increased or expanded international R&D collaboration.

The Department of Biotechnology (DBT) from India and International Science and Technology Partnerships Canada (ISTP Canada), an NGO selected by the government of Ontario on the Canadian side, have called for proposals from eligible scientists for the project. Researchers and managers of Indian companies, academic institutions, research hospitals or other R&D institutions that are headquartered and operate in India can be part of the project. Each proposal for the project must identify an eligible lead from Ontario (Canada) and India who will be responsible for the development and submission of the joint application within their province or country; must include at least one company from Ontario (Canada) and India. Furthermore, clear commercial goals and associated commercialization strategies must be articulated.

Source: http://www.pharmabiz.com

US investing $100M towards HIV/AIDS research

The National Institutes of Health (NIH), the United States, is planning to redirect AIDS research funds in an effort to expand support for research toward finding a cure for HIV. Over the next three fiscal years, the NIH will be investing an additional $100 million in this area of HIV/AIDS research. National Institute of Allergy and Infectious Diseases (NIAID), the United States, director Anthony S. Fauci, M.D., said in a statement made at the White House in a presentation that while the epidemic could be ended by scaling up the tools that have already been established as effective in treating HIV and preventing its spread, a cure could help the millions of people currently infected that have to rely on antiretroviral treatments. Also, he added, many new developments in AIDS research have brought the once seemingly insurmountable task of finding a cure for the deadly disease into the realm of possibility.

"Our growing understanding of the cellular hiding places or 'reservoirs' of HIV, the development of new strategies to minimize or deplete these reservoirs, and encouraging reports of a small number of patients who have little or no evidence of virus despite having halted antiretroviral therapy, all suggest that the time is ripe to pursue HIV cure research with vigor," Dr. Fauci said.

Source: http://www.genengnews.com

Malaysia and Singapore join hands for biotech growth

Malaysia-based biotech park Bio-XCell and Singapore's biotech association, BioSingapore, join hands to promote cross-border alliances between life sciences communities in Iskanadar, Johor and Singapore. The inaugural collaboration will explore how Bio-XCell and its clients, and BioSingapore members can derive benefits from each other. For example Bio-XCell and its clients can benefit from the technical and professional services provided by BioSingapore members and BioSingapore members can take advantage of the benefits provided by locating themselves at Bio-XCell. The collaboration would promote both location and its merits in relation to the biotech industry to their respective members, contacts and databases. Mr. Rizatuddin Ramli, CEO, Malaysian BioXCell, said, "Bio-XCell is pioneering in catalyzing an integrated ecosystem and this connection with BioSingapore would leverage on each other's expertise to develop innovative biotechnology products by Asians for Asians, before setting to global markets. We aim to foster a holistic ecosystem for the creation of prodigious businesses from good sciences.

Mr. Simranjit Singh, chairman, BioSingapore, said, "Both Malaysia and Singapore have put great emphasis on developing the Biomedical sciences industry as the next economic growth engine. The establishment of BioXCell in Iskandar and the world class infrastructure found in Singapore such as Biopolis and the Tuas Biomedical Park can serve as a nexus for Biomedical sciences companies to grow and thrive in this region." He further said, "Singapore's core strengths of R&D, technical services and intellectual property management coupled with Malaysia's focus on bio-manufacturing and logistics could be a potent combination for Biomedical companies. I do believe that this represents an excellent opportunity to replicate the successful model of the Medicon Valley (Denmark & Sweden) in Iskandar and Singapore. BioSingapore aims to partner with BioXCell to encourage cross border alliances & business expansion opportunities for both Singaporean and Malaysian Biomedical companies."

Source:
http://www.biospectrumasia.com

Illumina Inc. to acquire Genomic Informatics Company

Illumina, Inc. (San Diego, CA, USA) has signed an agreement to acquire NextBio (Santa Clara, CA, USA), a developer of clinical and genomic informatics. NextBio's comprehensive big-data platforms aggregate and analyze large quantities of phenotypic and genomic data for research and clinical applications. With the addition of NextBio's platform upon completion of the acquisition, Illumina will be able to offer customers enterprise level bioinformatics systems that will advance the discovery of new correlations between the human genome and disease, and finally, enable the application of those discoveries within healthcare.

"This agreement with NextBio demonstrates Illumina's unwavering commitment to drive the adoption of sequencing in new markets and vastly improve the genomic information workflow," said Jay Flatley, president and CEO of Illumina. "NextBio enables the classification and aggregation of phenotypic and clinical data within a single environment and allows analysis of that data at unprecedented speed and scale. The combination of Illumina's BaseSpace cloud computing environment for next-generation sequencing with NextBio's platform for integrating patient data will allow us to deliver solutions that seamlessly integrate the entire workflow from sample to result."

NextBio's platform allows customers to quickly compare their experimental results against thousands of published and private data sets via a novel correlation engine, which pre-computes billions of significant connections between disparate data components and helps discover new correlations. NextBio Clinical, which in 2012 passed an independent HIPAA audit, is designed for seamless integration with existing clinical and research systems. Backed by highly scalable software-as-a-service (SaaS) enterprise technology, it is capable of analyzing petabytes of data.

Illumina is a developer, manufacturer, and marketer of life science tools and integrated systems for the analysis of genetic variation and function. The company provides sequencing and array-based solutions for genotyping, copy number variation analysis, methylation studies, gene expression profiling, and low-multiplex analysis of DNA, RNA, and proteins. Illumina also provides tools and services for consumer genomics and diagnostics.

Source:
http://www.biotechdaily.com

Roche, Molecular partners to launch cancer drug treatment

Roche, Switzerland, and Molecular Partners, Switzerland have entered

into a potentially billion-dollar collaboration giving Roche rights to develop a new class of "several" cancer treatments that combine its toxic agents with Molecular Partners' DARPin® biologics.

The deal could net Molecular Partners more than CHF 1 billion ($1.1 billion), most of it tied to development and sales milestones. Roche agreed to pay Molecular Partners CHF 55 million ($60.7 million) in up-front and initiation payments to launch the research collaboration and licensing agreement. Molecular Partners will also receive tiered royalties on any future product sales into the double-digit percentage range.

DARPins are non-antibody-based small proteins where a variable region has been engineered for target binding. Roche and Molecular Partners reason that DARPins are ideal targeting agents to deliver toxic agents to tumors to kill cancer cells based on their small size and high binding affinity, which enable them to hone in on and penetrate deep into solid tumors. DARPins also have a higher selectivity for tumor cells compared to other biologics including antibody drug conjugates, based on their ability to bind to different epitopes than antibodies, and bind to multiple epitopes or targets in parallel at the same time, the companies say.

Source:
http://www.genengnews.com

Medical devices market in India

India's medical device market is currently the fourth largest market in Asia with 700 medical device makers, and ranks among the top 20 in the world, according to data from the India Semiconductor Association. The Indian medical device and equipment market is expected to grow to around $5.8 billion by 2014 and $ 7.8billion by 2016, growing at a Compound Annual Growth Rate (CAGR) of 15.5 percent, according to an industry report. "Currently valued at $4.4 billion, the Indian medical device and equipment market is expected to grow to around $5.8 billion by 2014 and $7.8 billion by 2016, growing at a CAGR of 15.5 percent," Grant Thornton India said in its report on medical technology sector.

India's medical device market is currently the fourth largest market in Asia with 700 medical device makers, and ranks among the top 20 in the world, according to data from the India Semiconductor Association. The outlook for medical devices segment over the next few years remains strong, with more recent trends such as greater adoption of health insurance (private as well as state-funded) likely to further increase the penetration of healthcare across the country. The financial support in the form of fiscal benefits, technological advancements and policy changes are bound to create a strong opportunity for India to build global competitive edge in the healthcare sector, the report said. The Indian medical devices industry forms a very small part of the total manufacturing industry accounting for only 0.2 percent of all certified facilities.

Source:
http://www.iamers.org

Researchers to develop anticalin-based protein drug

India-based Zydus Cadila and Pieris, a next generation Germany-based therapeutic protein R&D company, have entered into an alliance for development and commercialization of multiple novel anticalin-based protein therapeutics. Under the terms of the agreement, Zydus will take the lead in advancing anticalin drug candidates through formal preclinical development and into clinical development, undertaking drug development in accordance with ICH guidelines. Zydus has been granted exclusive marketing rights in India and several other emerging markets, while Pieris retains exclusive marketing rights in key developed markets. The most advanced program in the collaboration is PRS-110, an anticalin specific for c-Met, a target becoming increasingly validated across a broad spectrum of tumors. PRS-110, which is a pure antagonist due to its monovalent target engagement, has demonstrated the ability to inhibit both ligand-dependent and independent c-Met activity in a variety of animal models.

Through this unique collaborative model, the companies seek to develop candidates to proof-of-concept and will explore out-licensing opportunities in Pieris' territories at the appropriate time. Mr. Pankaj R Patel, chairman and MD, Zydus group, said that, "Collaborating with established biotech companies on differentiated drug candidates is an important component of Zydus' ongoing transformation into an innovation-led global healthcare provider, and we are pleased to add anticalins to our novel biologics pipeline." Mr. Stephen Yoder, CEO, Pieris, added that, "With Zydus' state-of-the-art manufacturing facilities and seasoned drug development team, this collaboration will allow Pieris to unlock value on a global scale in a cost-effective manner, significantly expanding the number of proprietary anticalin programs we can advance into clinical trials."

Source:
http://www.genengnews.com

Researchers reveal dysfunction in diabetic kidney disease

Researchers at the University of California, San Diego School of Medicine, the United States, have identified 13 metabolites – small molecules produced by cellular metabolism – that are significantly different in patients with diabetes and chronic kidney disease compared to healthy controls. Twelve of the 13 metabolites are linked to mitochondrial function, suggesting that suppression of mitochondria – the powerhouses of cells – is a fundamental characteristic of diabetic kidney disease. The findings are published in the November edition of the *Journal of the American Society of Nephrology*.

"This work provides strong evidence that reduced mitochondrial function is a dominant feature of human diabetic kidney disease," said first author Kumar Sharma, professor of medicine and director of the Center for Renal Translational Medicine at UC San Diego. "We found that a specific cellular pathway, AMPK-PGC1a, likely plays a key role to reduce mitochondrial function and content, which means that new therapeutic approaches that restore and increase mitochondrial function and content could ameliorate or perhaps even arrest chronic kidney disease."

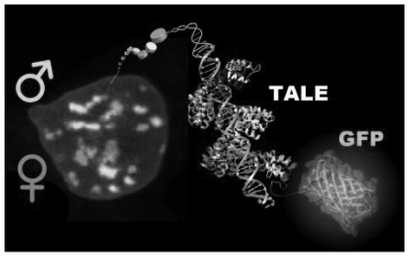
Diabetic kidney disease is the leading cause of end-stage kidney disease, which is the eighth leading cause of death in the United States and a major risk factor for cardiovascular disease, the nation's leading killer. An estimated 26 million American adults have chronic kidney disease (CKD), with millions more at increased risk. These patients often require dialysis or an organ transplant. The primary causes of CKD are high blood pressure and diabetes. Rates of both CKD and diabetes have risen dramatically in the last decade, particularly among people aged 65 and older. According to the National Kidney and Urologic Diseases Information Clearinghouse, the annual mortality rate for end-stage renal disease rose from 10,478 in 1980 to 90,118 in 2009, though it has declined somewhat in recent years.

Source:
http://www.geneticstimes.com

Gene movements observed *in vivo*

A research team working under Maria Elena Torres Padilla, an Inserm research director at the Institute of Genetics and Molecular and Cellular Biology (Inserm/CNRS/University of Strasbourg, France), has just developed a method of observing the organization and movements of the genome in time and space. The researchers succeeded in marking then monitoring parent genes during cell division. This new method will be a great step forward to understanding the resulting processes that control gene regulation.

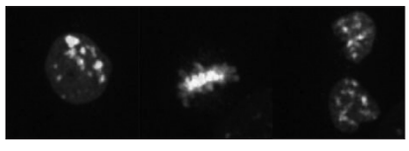
In the study, the researchers attempted to better understand the dynamics of the position of the genome in the nucleus in order to obtain a better overall understanding of the genome and the expression of its genes. TALE proteins were first discovered in bacteria. They are proteins that bind with "artificial" DNA and are capable of targeting a specific DNA sequence in a cell. In use since 2009, this technology has up till now been used with nucleases, enzymes that are capable of accurately cutting targeted DNA. The work carried out by Maria-Elena Torres-Padilla's team consisted in using TALE technology to mark a genome sequence and visualize its movement in vivo. The researchers succeeding in merging a green



The green fluorescent protein (GFP) is bound to a TALE protein, which is bound to a DNA sequence. (Credit: Yusuke Miyanari)

fluorescent protein (mClover) with a TALE protein, which allowed them to observe the localization of specific DNA sequences inside the nucleus of living cells. This method, known as TGV (TALE-mediated Genome Visualization) gave the expected results and allowed the marked target DNA to be monitored in real-time.

All cells in the body contain two complete sets of chromosomes, one from the mother and one from the father. "We specifically marked chromosomes either from the father or the mother, and then using TGV technology, we managed to monitor their location during the subsequent cell divisions," explains Maria-Elena Torres-Padilla, research director at Inserm and principal author of the study. "Our observations have opened up important new prospects of finding answers to questions in varied fields of research such as the cell cycle, DNA dynamics and in-depth study of the expression of parent genes, in particular do they behave and are they expressed in the



The genes from the father were marked with a red fluorescent protein (RFP) while those from the mother were marked with a green fluorescent protein (GFP). (Credit: Yusuke Miyanari)

same way," concludes Maria-Elena Torres-Padilla.

Source: http://presse-inserm.fr

Genes protect themselves against being silenced

Researchers from Harvard Stem Cell Institute (HSCI), the United States, have settled a century-old debate over whether occurrence of DNA methylation acts to silence gene expression, or if genes are turned off by other means before they are methylated. As explicated in the journal *Nature*, methylation in fact enforces gene silencing, and it is levels of a newly identified form of RNA produced by individual genes that determine whether they are turned off by the addition of a methyl (CH3) group by the enzyme DNA methylase 1 (DNMT1).

The study, led by HSCI Principal Faculty member Daniel Tenen, found that during transcription of DNA to RNA, a gene produces a small amount of what the investigators named "extracoding RNA," which stays in the nucleus and binds to DNMT1, blocking its ability to methylate, or silence the gene. The discovery of RNA's new function has therapeutic potential as an on-off switch for gene expression. Postdoctoral fellow Annalisa Di Ruscio, and laboratory staff member Alexander Ebralidze, were major contributors to the work.

"We have demonstrated, at least for one gene in detail, and probably thousands more, that extracoding RNA serves to protect the gene from methylation," said Tenen, who heads laboratories at Beth Israel Deaconess Medical Center and the Cancer Science Institute of Singapore, where he is director, at the National University of Singapore. "When the RNA is shut off, which we did by various means, the gene becomes methylated." The biological irony is that DNMT1 has long been considered a DNA-binding enzyme, so it is surprising that it is able to bind so well to extracoding RNA, Tenen explained.

Source: http://www.hsci.harvard.edu

RNA controls splicing during gene expression

RNA is the key functional component of spliceosomes, molecular machines that control how genes are expressed, report scientists from the University of Chicago, the United States, in the journal *Nature*. The discovery establishes that RNA, not protein, is responsible for catalyzing this fundamental biological process and enriches the hypothesis that life on earth began in a world based solely on RNA. "Two of the three major processes in eukaryotic gene expression – splicing and translation – are now shown to be catalyzed by RNA," said Jonathan Staley, associate professor of molecular genetics and cell biology at the University of Chicago, the United States, and co-corresponding author on the study. "The eukaryotic gene expression pathway is more of an RNA-based pathway than protein-based."

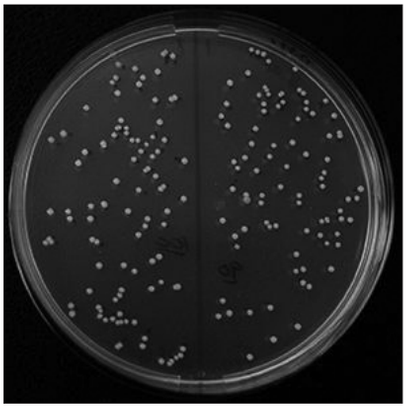
For genes to be expressed, DNA must be translated into proteins, the structural and functional molecules that catalyze chemical reactions necessary for life. To do so, genetic information stored in DNA is first copied into strands of messenger RNA (mRNA), which are subsequently used to create proteins. In eukaryotes, almost all genes undergo alternative splicing, in which a precursor form of mRNA is cut and re-stitched together in numerous different combinations. This significantly increases the number of proteins a single gene codes for, and is thought to explain much of the complexity in higher-order organisms. Splicing is a critical biological mechanism – at least 15 percent of all human diseases are due to splicing errors, for example.

The researchers first disabled the ability of the spliceosome to self-correct errors in splicing. They then modified single atoms at sites on mRNA precursors known to be cut during splicing, as well as several on U6, an RNA subunit of the spliceosome hypothesized to be important for catalysis. Some of these modifications rendered splicing ineffective. They went through and systematically rescued this loss-of function, investigating sites individually and in combination. This allowed them to hone in on locations critical to splicing function and to identify connections between U6 and mRNA precursors. The team found that the U6 RNA subunit directly controls catalytic function – effectively acting as the blade of the spliceosome. This is the first experimental proof that RNA is the key functional component of this critical biological mechanism.

Source: http://www.eurekalert.org

Bacteria recycle broken DNA

Søren Overballe-Petersen and professor Eske Willerslev, researchers from the Centre for GeoGenetics at the Natural History Museum of Denmark and Kaare M. Nielsen from University of Tromsø, Norway, have now shown that bacteria can take up small as well as large pieces of old DNA from this scrapheap and include it in their own genome. This discovery may have major consequences both in connection with resistance to antibiotics in hospitals and in our perception of the evolution of life itself.



Colonies of bacteria (Acinetobacter baylyi) on an agar plate (growth medium). (Credit: Kaare M. Nielsen)

The research group's results reveal that the large reservoir of fragments and damaged DNA in the surroundings preserve the potential to change the bacteria's genomes even after thousands of years. This is the first time a process has been described which allows cells to acquire genetic sequences from a long gone past. This phenomenon is called Anachronistic Evolution or Second-hand Evolution.

Furthermore, old DNA is not limited to only returning microbes to earlier states. Damaged DNA can also create new combinations of already functional sequences. You can compare it to a bunch of bacteria which poke around a trash pile looking for fragments they can use. Occasionally they hit some 'second-hand gold', which they can use right away. At other times they run the risk of cutting themselves up. It goes both ways. This discovery has a number of consequences partially because there is potential risk for people when pathogen bacteria or multi-resistant bacteria exchange small fragments of 'dangerous' DNA e.g. at hospitals, in biological waste and in wastewater.

Source: http://www.news.ku.dk

Deleting single gene provokes mutations in the genome

J. Marie Hardwick, the David Bodian professor of Molecular Microbiology and Immunology at the Johns Hopkins Bloomberg School of Public Health and a professor of Pharmacology and Molecular Sciences at the School of Medicine, the United States, report that the deletion of any single gene in yeast cells puts pressure on the organism's genome to compensate, leading to a mutation in another gene. Their discovery, which is likely applicable to human genetics because of the way DNA is conserved across species, could have significant consequences for the way genetic analysis is done in cancer and other areas of research, they say.

The findings call researchers to greater scrutiny in their genetic analyses because they could unwittingly attribute a phenomenon to a gene they mutated, when it is actually due to a secondary mutation.The beauty of working with yeast, Hardwick says, is that it is easy to delete, or "knock out," any given gene. Her team started with a readily available collection of thousands of different yeast strains, each with a different gene knockout. In total, the team's evidence indicates that 77 percent of all the knockout strains have acquired one or two additional mutations that affect cell survival and/or excessive growth when food is scarce. In all of the strains that they examined, they found that the secondary mutations that appeared after a given knockout were always in the same one or two genes as in their earlier observations. Unexpectedly, Hardwick said, the altered growth of the sub-strains was usually due to the secondary mutations, not the original knockout, and many of those secondary mutations were in genes that are known to be cancer-causing in humans.

Source: http://www.hopkinsmedicine.org

Un-junking junk DNA

A study led by researchers at the University of California, San Diego School of Medicine, the United States, shines a new light on molecular tools our cells use to govern regulated gene expression. "We uncovered a novel mechanism that allows proteins that direct pre-mRNA splicing – RNA-binding proteins – to induce a regulatory effect from greater distances than was thought possible," said first author Michael T. Lovci, a biomedical sciences graduate student working in the Department of Cellular and Molecular Medicine, the Stem Cell Research Program and Institute for Genomic Medicine at UC San Diego.

Researchers from California, Oregon, Singapore and Brazil made this finding while working toward an understanding of the most basic signals that direct cell function. According to Lovci, the work broadens the scope that future studies on the topic must consider. More importantly, it expands potential targets of rationally designed therapies which could correct molecular defects through antisense RNA oligonucleotides – small pieces of DNA or RNA that can bind to specific RNA targets to either block interactions with RNA-binding proteins and/or initiate degradation of the target RNA.

"This study provides answers for a decade-old question in biology," explained principal investigator Gene W. Yeo, PhD, assistant professor of Cellular and Molecular Medicine, member of the Stem Cell Research Program and Institute for Genomic Medicine at UC San Diego, as well as with National University of Singapore."

Source: http://www.newswise.com

How protein suicide assures healthy cell structures

Researchers from Instituto Gulbenkian de Ciência (IGC; Portugal), led by Monica Bettencourt-Dias, have now discovered that the master protein regulator in centriole formation, Polo-like kinase 4 (PLK4), needs to self-destruct in a regulated manner to ensure the presence of a normal number of centrioles in cells. The other two authors of this work are Inês Bento and Inês Cunha Ferreira.

PLK4 is one of the key proteins required to control centriole formation: in its absence centrioles fail to form, while in excess PLK4 induces the formation of an extra number of those structures. Bettencourt-Dias' team has now identified how PLK4 controls its levels, and ultimately the number of centrioles. By performing different biochemical assays, the researchers observed that PLK4 is capable of auto-regulating its levels by adding chemical groups of phosphate to itself, which will act as a signal for destruction. However, if PLK4 kills itself too early this will prevent it from ensuring the control of centriole number.

Data obtained by the research team shows that the destruction mechanism undergoes a determined sequence of events that provides PLK4 with enough time for centriole number control before it is degraded. This study was carried out in collaboration with researchers at the Institute of Biochemistry and Biophysics (Warszawa, Poland) and at the Cancer Research UK Cell Cycle Genetics Group (University of Cambridge, UK). Inês Cunha-Ferreira and Inês Bento (IGC) contributed equally to the work. This research was funded by the Fundação para a Ciência e a Tecnologia (FCT, Portugal), the European Molecular Biology Organization (EMBO), and the European Research Council (ERC).

Source:
http://www.igc.gulbenkian.pt

New proteins to block graft-vs.-host disease

Researchers from the University of Michigan Comprehensive Cancer Center, the United States, have identified new proteins that control the function of critical immune cell subsets called T-cells, which are responsible for a serious and often deadly side effect of lifesaving bone marrow transplants. These new proteins have not previously been associated with T-cell responses. T-cells help fight infections but also can trigger autoimmune diseases or graft vs. host disease, a side effect of bone marrow transplant in which the new donor cells begin attacking other cells in the patient's body.

"We identified new targets within the T-cells that regulate the immune response to foreign antigens. If these proteins can be targeted, it may prove helpful in reducing graft-vs.-host disease," says study first author Yaping Sun, internal medicine research investigator at the U-M Medical School. Pavan Reddy, professor of hematology/oncology at the U-M Medical School is the senior study author. The study is published in the Journal of Clinical Investigation.

In this study the researchers looked at the landscape of mRNA and micro-RNA after the T-cells were activated by different kinds of stimuli. mRNA are made from the genes present in the DNA and serve as templates for making proteins. Micro-RNA are also copied from the DNA but do not code for proteins; instead they fine tune the expression of other genes and proteins. This research is still in its early stages. No compounds currently are known to target Wapal or Synj1. Additional research is needed.

Source:
http://www.uofmhealth.org

Researchers identify key proteins for immune strategy

A new research from the Masonic Cancer Center, University of Minnesota, and the University of Minnesota Center for Immunology in the United States has identified key proteins that influence immune response strategies, a finding that could influence new vaccination approaches. The study, published in the latest edition of *Nature Immunology*, looked closely at the KLF2 and S1P1 genes, and how their expression impacted the immune strategy of a cell. The immune system has two main strategies to empower white blood cells, or lymphocytes, to resist infections of the body.

The first strategy, called recirculation, is a process where white blood cells are carried around in circulating blood, allowing rapid access to organs once an immune response has begun. The second major strategy allows lymphocytes to migrate into tissues and remain there long term, creating a kind of rapid response team to any infectious organism that enters the body. These cells are called resident memory T-cells or Trm, and they play a dominant role in initiating immune responses that control infections.

"A key question we had was how lymphocytes make the choice to be a recirculator or a resident," said Stephen Jameson, a professor in the Center for Immunology and Department of Laboratory Medicine

and Pathology in the University of Minnesota Medical School. "We already knew the protein KLF2 regulates the expression of genes. One of those genes, called S1P1, allows lymphocytes to leave tissues and begin recirculating."

Intrigued by the impact of KLF2 and S1P1 on lymphocytes' ability to move out of tissues, Jameson and colleagues wanted to compare resident and recirculating cells and the KLF2 and S1P1 levels. They found that resident T-cells had lost expression of the KLF2 and S1P1 genes. The next step was finding what controlled the expression of KLF1 and S1P1. Jameson's team was able to pinpoint cytokines as playing a major role in this cell decision-making process.

Source:
http://www.healthtalk.umn.edu

Safer gene therapy

A protein engineered by researchers at KU Leuven, Belgium, combining proteins active in HIV and Moloney murine leukaemia virus (MLV) replication may lead to safer, more effective retroviral gene therapy.

Gene therapy involves inserting healthy genetic material into a diseased cell. Using a carrier derived from a retrovirus, the genetic material is smuggled into a human cell where, once inside, it integrates itself into the cell's DNA. But gene therapy is not without risks. If integrated too near a carcinogenic gene, the newly introduced genetic material can also induce disease-causing mutations. The research is published in Cell Reports. A separate protein, which plays a role in HIV, does not have that problem. It only integrates itself in 'safe' places in the host cell's DNA. The researchers put one and two together to create a safer viral vector: "We developed a fused protein with the head of the protein that HIV uses and the tail of the protein that MLV uses," Dr. Rik Gijsbers explains.

The researchers say their retrofitted retroviral vector works: "Our experiments with cell cultures show that in the presence of this protein, the viral vector always inscribes itself in a safe place, just as it does in the HIV virus," says Dr. Gijsbers. Several years ago, scientists successfully used viral vectors derived from MLV to treat a congenital immune system abnormality in children. Some of these children later developed leukaemia. "In these cases, the viral vector embedded itself near a carcinogenic gene," explains professor Zeger Debyser, the corresponding author. "This disrupts the gene and leads to a higher leukaemia risk – a serious setback for gene therapy. It put a heavy damper on gene therapy's future development." Though the initial results are promising, more research is needed to refine them, says Dr. Gijsbers.

Source:
http://www.kuleuven.be

Protein could help stop spread of cancer cells

Researchers from the Universities of Bristol and Birmingham, the United Kingdom, who have been studying breast and prostate cancer cells, show how manipulating PRH's levels in cancer cells can hinder their ability to penetrate into neighboring environments, potentially preventing them from entering nearby blood vessels. The findings could lead to new ways of combating the spread of the disease in multiple cancers. Dr. Kevin Gaston, Reader at Bristol's School of Biochemistry in the Faculty of Medical and Veterinary Sciences and Dr. Padma-Sheela Jayaraman, Senior Lecturer at the University of Birmingham, are the authors of this work.

Understanding how and why cancer cells move away from their original location is important to find ways to stop the spread of the disease. New findings, published in the Nature journal Oncogene, reveal how a protein, called 'PRH', is normally able to prevent cells from unnecessary migration. It is likely that this protein is less effective in cancer cells allowing the cells to venture away. PRH belongs to a group of proteins known as 'transcription factors', meaning its role is to interact with DNA to 'switch' particular genes 'on' or 'off'. Scientists have been aware of PRHs' role in controlling cell growth and specification for some time. For example, it is essential for the healthy development of fetuses but this is the first time PRH has been implicated in the movement of cancer cells.

After growing normal and cancerous breast and prostate cells in the laboratory the team used genetic techniques to either increase or decrease PRH levels. The team then examined the cells and found that without PRH, the cells migrated much faster, and were able to invade through a porous gel more efficiently. Katherine Woods, Research Information Manager at Breast Cancer Campaign, said: "This interesting work has brought us another step closer to understanding how breast cancer cells move and spread around the body, and closer to knowing how we could stop this spread to help women outlive the disease. This research is all the more valuable because it could have implications for other cancers such as prostate and thyroid cancer, and some leukemia."

Source:
http://www.bristol.ac.uk

Researchers regenerate bioengineered salivary gland

A research group led by Professor Takashi Tsuji of Tokyo, University of Science and Organ Technologies Inc., Japan, has provided a proof-of-concept for bioengineered mature organ replacement as a regenerative therapy. Current advances in regenerative therapies have been influenced by the study of embryonic development, stem cell biology, and tissue engineering technologies. The ultimate goal of regenerative therapy is to develop fully functional bioengineered tissues that can replace lost or damaged organs following disease, injury or aging.

Salivary glands play essential roles in normal upper gastrointestinal tract function and oral health, including the digestion of starch by salivary amylase, swallowing and the maintenance of tooth hard tissues through the production of saliva. There are three major salivary glands – the parotid, submandibular and sublingual glands – as well as minor salivary glands. Salivary glands are composedof duct, acinar, and myoepithelial cells.

Source:
http://www.sciencedaily.com

Malaria vaccine for pregnant women

The United States based CMC Biologics, focused on process development and cGMP manufacture of protein therapeutics, have entered into an agreement with the University of Copenhagen, Denmark, for process development and cGMP clinical production of VAR2CSA for a placental malaria vaccine. The project is focused on developing a novel prophylactic vaccine designed to protect women against malaria during pregnancy. In 2003, professor Ali Salanti and others at University of Copenhagen discovered the antigen VAR2CSA, which enable parasite accumulation in the placenta.

The VAR2CSA molecule, developed by the University of Copenhagen, has the potential to significantly reduce the effects of the parasite. The vaccine attempts not to eliminate the infection, but to eliminate the disease. The vaccine antigen will be produced using ExpreS2ion Biotechnologies' proprietary insect cell-based recombinant protein expression platform, ExpreS2. "Through collaborations like this, we have the opportunity to make a real difference in a disease with major global health implications by helping to take the program into human clinical trials," said Mr. Gustavo Mahler, Global Chief Operations Officer of CMC Biologics.

Source:
http://www.biospectrumasia.com

Scientists discover molecules for new anti-flu medicines

Scientists at Rutgers University, the United States, are working to find a new way to attack flu viruses by identifying chemical agents that block the virus' ability to replicate itself in cell culture. These novel compounds show promise for a new class of antiviral medicines to fight much-feared pandemic influenzas such as the looming "bird flu" threats caused by the H5N1 influenza A virus and the new H7N9 virus responsible for a 2013 outbreak in China.

Timely production of a vaccine is difficult when a pandemic flu strikes. A viable alternative is to treat with drugs. "Right now there's really only one effective oral drug for treating influenza," said Eddy Arnold, Board of Governors, professor of chemistry and chemical biology in the School of Arts and Sciences at Rutgers and a member of the Center for Advanced Biotechnology and Medicine. And just as bacteria develop resistance to antibiotics, Arnold notes that some flu strains have developed resistance to Tamiflu, the sole orally available anti-flu drug. Arnold and his collaborators have been working to create drugs beyond Tamiflu, especially ones that target different parts of the virus, using an approach that helped in the development of powerful anti-AIDS drugs. By synthesizing chemical compounds that bind to metal ions in a viral enzyme, the researchers found they could halt that enzyme's ability to activate a key step in the virus's replication process.

Rutgers' search for these binding compounds relies on technology that reveals the structure of this enzyme in extremely fine detail. Researchers Joseph Bauman and Kalyan Das first produced high-resolution images of an H1N1 flu enzyme, and Bauman and post-doctoral researcher Disha Patel screened 800 small molecule fragments for binding. The researchers in Arnold's lab worked with Edmond LaVoie, professor and chair of medicinal chemistry in the Ernest Mario School of Pharmacy, the United States, to modify those compounds, making them more potent and selective in blocking the flu enzyme's activity. Working with virologist Luis Martinez-Sobrido at the University of Rochester, the United States, they were able to detect antiviral activity of the compounds in cells.

Source:
http://www.dnaindia.com

E. Coli to combat hard-to-treat bacterial infections

Researcher Matthew Wook Chang and his colleagues from Nanyang Technological University (NTU), Singapore, explain that biofilm infections are difficult to treat because the bacteria hide away under a protective barrier of sugars, DNA and proteins. That shield makes them very resistant to conventional therapies. In addition, overuse of antibiotics in medicine and agriculture also have made some bacteria, such as MRSA, shrug off most known treatments, making at least 2 million Americans sick every year.

The notorious bacteria *E. coli* is best known for making people sick, but scientists have reprogrammed the microbe that also comes in harmless varieties, to make it seek out and fight other disease-causing pathogens. The researchers' report appears in the journal ACS Synthetic Biology and describes development of this new type of *E. coli* that can even kill off slimy groups of bacteria called biofilms that are responsible for many hard-to-treat infections, such as those that take hold in the lungs, the bladder and on implanted medical devices.

They reprogrammed *E. coli* to sense Pseudomonas aeruginosa, bacteria that can form biofilms and causes hospital-acquired infections in the lungs and the gut. The new *E. coli* then swims directly toward P. aeruginosa and launches an attack with an antimicrobial peptide and an enzyme that breaks down biofilms. Though the researchers successfully tested their engineered microbe on P. aeruginosa, they say that their engineering strategy could be used to combat other pathogens as well.

Source: http://www.acs.org

Triple-negative breast cancer target for drug development

According to Luika Timmerman, a researcher from University of California, San Francisco, the United States, often deadly "triple-negative" breast cancers might be effectively treated in many cases with a drug that targets a previously unknown vulnerability in the tumors. Timmerman found that many cell lines obtained from triple-negative breast cancer are especially dependent on cystine, one of the 20 amino acids that are the building blocks of proteins that all cells need.

Roughly one in six women with breast cancer has triple-negative breast cancer, and only about three out of four with this type survive five years or more. These tumors sometimes grow aggressively, advancing from being undetectable to becoming difficult-to-treat between regular screening mammography exams, for instance. Drugs now are available that effectively target the estrogen and HER2 receptor proteins, which are found in many breast tumors, and these drugs spare most normal cells in the body. However, triple-negative breast cancers are difficult to treat effectively because they do not make either of these receptors. To treat patients with triple-negative breast cancer, physicians instead use older chemotherapies that produce side effects in normal tissues, thus limiting the doses that patients can receive.

Timmerman found that she could significantly slow growth of triple-negative tumors using an FDA-approved anti-inflammatory drug called sulfasalazine to block a specific cystine transporter called xCT. While sulfasalazine itself would not be appropriate for treating cancer, Timmerman said, it could serve as a "lead compound" that could be used to develop drugs that specifically target xCT on tumor cells. But she also measured amino acids and other molecules in cell culture to detect metabolic changes. When she did so, she noticed that cystine and glutamate levels are frequently correlated in triple-negative cancers.

Source: http://www.ucsf.edu

Researchers develop potential therapy for pancreatic cancer

At the University of Cincinnati (UC), the United States, researchers have discovered a biomarker, known as phosphatidylserine (PS), for pancreatic cancer that could be effectively targeted, creating a potential therapy for a condition that has a small survival rate. These findings also show that the use of a biotherapy consisting of a lysosomal protein, known as saposin C (SapC), and a phospholipid, known as dioleoylphosphatidylserine (DOPS), can be combined into tiny cavities, or nanovesicles, to target and kill pancreatic cancer cells. Lysosomes are membrane-enclosed organelles that contain enzymes capable of breaking down all types of biological components; phospholipids are major components of all cell membranes and form lipid bilayers or cell membranes.

"Only a small number of promising drugs target pancreatic cancer, which is the fourth-leading cause of cancer deaths, with a five-year survival of less than 5 percent," says Xiaoyang Qi, PhD, associate professor of hematology oncology at UC and lead researcher on the study. Qi says a distinguishing feature of SapC-DOPS is its ability to bind to phosphatidylseriine (PS), a lipid, which is found on the membrane surfaces of pancreatic tumor cells. Qi adds that animals treated with SapC-DOPS showed clear survival benefits and their tumors shrank or disappeared. "This study provides

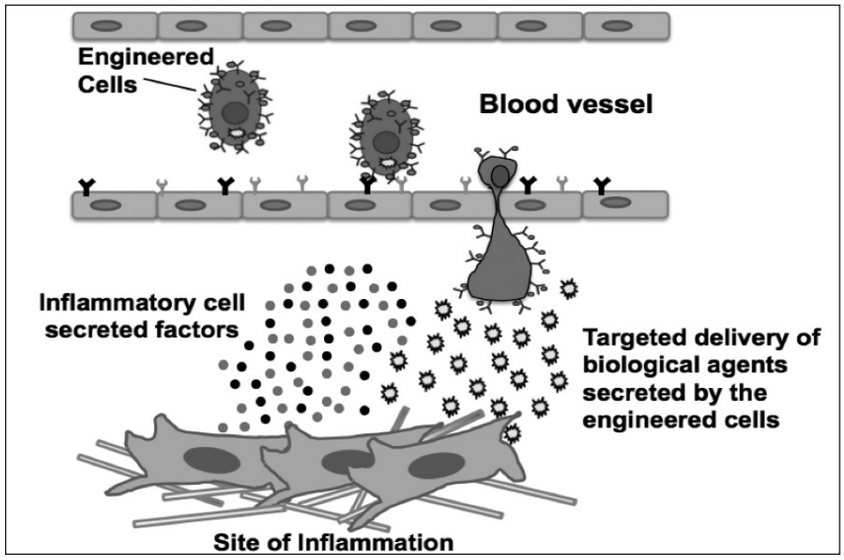
convincing evidence in support of developing a new therapeutic approach to pancreatic cancer.

Source: http://healthnews.uc.edu

Stem cells as drug delivery vehicles

A group of researchers from the Brigham and Women's Hospital, Massachusetts, the United States, and Harvard Stem Cell Institute, the United States, and collaborators at the Massachusetts Institute of Technology, and Massachusetts General Hospital have found a way to use stem cells as drug delivery vehicles. The researchers inserted modified strands of messenger RNA into connective tissue stem cells, called mesenchymal stem cells, which stimulated the cells to produce adhesive surface proteins and secrete interleukin-10, an anti-inflammatory molecule. When injected into the bloodstream of a mouse, these modified human stem cells were able to target and stick to sites of inflammation and release biological agents that successfully reduced the swelling.

"If you think of a cell as a drug factory, what we're doing is targeting cell-based, drug factories to damaged or diseased tissues, where the cells can produce drugs at high enough levels to have a therapeutic effect," said research leader Jeffrey Karp, a Harvard Stem Cell Institute principal faculty member and associate professor at the Brigham and Women's Hospital, Harvard Medical School, and Affiliate faculty at MIT. Karp's proof of concept study, published in the journal Blood, is drawing early interest from biopharmaceutical companies for its potential to target biological drugs to disease sites. While ranked as the top sellers in the drug industry, biological drugs are still challenging to use, and Karp's approach may improve their clinical application as well as improve the historically mixed, clinical trial results of mesenchymal stem cell-based treatments.



Engineered mesenchymal stem cells are targeted to a site of inflammation to secrete anti-inflammatory interleukin-10 proteins.

Source: http://www.hsci.harvard.edu

Blood vessel cells can repair to regenerate organs

According to scientists at Weill Cornell Medical College, the United States, damaged or diseased organs may someday be healed with an injection of blood vessel cells, eliminating the need for donated organs and transplants. In studies appearing in recent issues of Stem Cell Journal and Developmental Cell, the researchers show that endothelial cells – the cells that make up the structure of blood vessels – are powerful biological machines that drive regeneration in organ tissues by releasing beneficial, organ-specific molecules.

They discovered this by decoding the entirety of active genes in endothelial cells, revealing hundreds of known genes that had never been associated with these cells. The researchers also found that organs dictate the structure and function of their own blood vessels, including the repair molecules they secrete. Together, the studies show that endothelial cells and the organs they are transplanted into work together to repair damage and restore function, says the study's lead investigator, Shahin Rafii, a professor of genetic medicine and co-director of the medical college's Ansary Stem Cell Institute and Tri-SCI Stem Center. When an organ is injured, its blood vessels may not be able to repair the damage on their own because they may themselves be harmed or inflamed, says Dr. Rafii, who is also an investigator at the Howard Hughes Medical Institute.

"Our work suggests that that an infusion of engineered endothelial cells could engraft into injured tissue and acquire the capacity to repair the organ," he says. "These studies -- along with the first molecular atlas of organ-specific blood vessel cells reported in the Developmental Cell paper -- will open up a whole new chapter in translational vascular medicine and will have major therapeutic application.

Source: http://www.sci-news.com

Salt-tolerant bacteria improve crop yields

Dilfuza Egamberdieva, group leader of microbiology at the National University of Uzbekistan, at Tashkent, hopes to apply her new agricultural technique of isolating salt-tolerant bacterial strains that live in salt-degraded soils, where they help the rooting process in plants, soon in Uzbekistan to boost the yield of economically important crops such as wheat, cotton, tomato and cucumber. She presented her work at this year's The World Academy of Sciences (TWAS) General Meeting.

Egamberdieva has been studying soil bacterial communities for more than 10 years. She has noticed that salty soils discourage bacterial growth, and stress plants at the same time. In addition, as she has repeatedly proven, salty soils often host bacteria that are noxious for humans. In her investigation, Egamberdieva has spotted beneficial soil salt-resistant bacteria that help plants grow better, causing no harm to men. These bacteria are found around the roots of plants. "We found that bacteria from the Pseudomonas family, in particular Pseudomonas extremorientalis, are salt-resistant and grow close to the roots, where they compete with other bacteria for colonization. On the contrary, pathogenic bacteria cannot actively colonize the plants' roots. Here, Pseudomonas produce antibiotics that plants use to defend themselves against fungi, trigger the rooting process and produce nodulation-promoting factors, thus giving the vegetation better chances to fix nitrogen and grow bigger." As an exchange for these favors, plants secrete exudates useful for the bacteria.

"We have already completed some experiments, both in protected greenhouses and in open fields, working in close contact with local farmers," said Egamberdieva, who is also engaged in promotion campaigns with the government and in outreach campaigns among farmers. "Crops treated with the "bacterial fertilizers" give yields 12–15 % higher than normal, when bacteria are administered to tomatoes and cucumber." Soon, Egamberdieva hopes, she will be given the green light to test her findings on real fields, thus helping farmers achieve better products. Her research has been supported mostly by international organizations and funding agencies.

Source: http://www.sciencedaily.com

Genetically modified tobacco plants for producing biofuels

Ruth Sanz-Barrio, an agricultural engineer of the NUP/UPNA-Public University of Navarre, Spain, and researcher at the Institute of Biotechnology (mixed centre of the CSIC-Spanish National Research Council, Public University of Navarre and the Government of Navarre), has demonstrated, for the first time, the viability of using specific tobacco proteins (known as thioredoxins) as biotechnological tools in plants. Specifically, she has managed to increase the amount of starch produced in the tobacco leaves by 700% and fermentable sugars by 500%. "We believe that these genetically modified plants," she explained, "could be a good alternative to food crops for producing biofuels, and could provide an outlet for the tobacco-producing areas in our country that see their future in jeopardy owing to the discontinuing of European grants for this crop."

Thioredoxins (Trxs) are small proteins present in most living organisms. In the course of her research Ruth Sanz demonstrated the capacity of the thioredoxins f and m in tobacco as biotechnological tools not only to increase the starch content in the plant but also to increase the production of proteins like human albumin. "For some time Trxs have been known to have a regulating function in living organisms, but in the thesis we have shown that they can also act by helping other proteins to fold and structure themselves so that they become functional."

Although commercial albumin is extracted from blood, the lack of a sufficient volume in reserve has prompted many researchers to seek new formulas for obtaining this protein on a large scale economically and safely. Genetically enhanced tobacco could be an alternative source of biomass in areas like Extremadura and Andalusia, the traditional tobacco producers. The estimated calculations of the starch production of these enhanced varieties would be the equivalent to those of crops like barley or wheat. "As cereals are currently being used as the raw material to produce bioethanol, genetically enhanced tobacco could be an alternative source of biomass and for obtaining clean energies."

Source: http://www.sciencedaily.com

Maximizing broccoli's cancer-fighting potential

John Juvik and colleagues at the University of Illinois, the United States, explain that diet is one of the most important factors influencing a person's chances of developing cancer. One of the most helpful food families includes cruciferous vegetables, such as broccoli, kale and cabbage. In fact, eating broccoli regularly has been linked to lower rates of prostate, colon,

breast, lung and skin cancers. In that super food, glucosinolates (GSs) and the substances that are left when GSs are broken down can boost the levels of a broccoli enzyme that helps rid the body of carcinogens. One way to increase GSs is to spray a plant hormone called methyl jasmonate on broccoli. This natural hormone protects the plants against pests. Juvik's team wanted to determine which GSs and their products actually boost the enzyme levels when broccoli is treated.

They tested five commercial types of broccoli by spraying them in the field with the hormone and found that, of the GS break-down products, sulforaphane is the major contributor toward enhanced cancer-fighting enzyme levels, although other substances also likely contribute, say the researchers. Environmental conditions played a role, too. They say that this information could be used to identify superior broccoli and to breed even more healthful broccoli plants. They published their findings, which could help scientists build an even better, more healthful broccoli, in *ACS' Journal of Agricultural & Food Chemistry*.

Source: http://www.sciencedaily.com

Scientists found key genes for increasing oil content in plant leaves

Scientists at the U.S. Department of Energy's Brookhaven National Laboratory have identified the key genes required for oil production and accumulation in plant leaves and other vegetative plant tissues. Enhancing expression of these genes resulted in vastly increased oil content in leaves, the most abundant sources of plant biomass-a finding that could have important implications for increasing the energy content of plant-based foods and renewable biofuel feedstocks. The experiments were carried out in large part by Brookhaven biochemist Changcheng Xu, who led the research, and Xu's group members Jilian Fan and Chengshi Yan.

The scientists decided to test the effects of overexpressing the newly identified oil-increasing genes (PDAT and oleosin) in a variant of test plants that already had an elevated rate of fatty acid synthesis. In this case, the genetic boost resulted in even greater oil production and accumulation-170-fold compared with control plants-to the point where oil accounted for nearly 10 percent of the leaf's dry weight. Xu is now collaborating with Brookhaven biochemist John Shanklin to explore the potential effect of overexpressing these key genes on oil production in dedicated biomass crops such as sugarcane.

Source: http://www.sciencedaily.com

New Habanero-type pepper

The Agricultural Research Service of the U.S. Department of Agriculture (USDA) and the College of Agriculture and Life Sciences of Texas A&M University recently announced the release of 'CaroTex-312', a new high-yielding, orange-fruited, Habanero type, F1 hybrid pepper (Capsicum chinense Jacq.). According to Kevin M. Crosby from Texas A&M University's Vegetable and Fruit Improvement Center, open-pollinated cultivars of Habanero peppers are used extensively by US growers, but the cultivars have historically suffered from several deficiencies, including low yields, late maturity, disease and pest susceptibility, and lack of uniformity. "Transition to F1 hybrid cultivars such as jalapeño, bell, and ancho has led to greatly increased yields, earlier maturity, and superior fruit quality." In the August 2013 issue of HortScience, Crosby and fellow researchers introduced 'CaroTex-312', the result of an F1 cross made at Charleston, South Carolina, between 'TigerPaw- NR' and UV88-2004. Crosby said that 'CaroTex-312' should appeal to consumers of Habanero-type peppers because of the new cultivar's large, attractive, orange-colored fruit.

"However," Crosby noted, "the most outstanding attribute of this new cultivar is its ability to produce high yields, particularly early in the season." The results of three replicated field studies conducted at Charleston in 2009 and 2010 showed that the total yield of marketable fruit harvested from 'CaroTex-312' equaled or exceeded the yields of total marketable fruit harvested from the 'TigerPaw-NR' parent, or from the open-pollinated control cultivar Habanero. "More important," Crosby said, "we found that average early yield (first harvest yield) was 19% of total yield (total of six harvests) for 'CaroTex-312', but only 4.7% of total yield for 'TigerPaw-NR' and 4.2% of total yield for the open-pollinated control cultivar 'Habanero'."

The yield attributes of 'CaroTex-312', particularly its potential for producing high early yields, should be especially appealing to growers trying to widen their marketing window. "We recommend 'CaroTex-312' for trial by fresh-market growers throughout the southern United States," Crosby said. The USDA has obtained a Plant Variety Protection Certificate for the 'TigerPaw-NR', parent of 'CaroTex-312'. 'TigerPaw-NR' seed is available to interested pepper researchers for experimental purposes. Small quantities of 'CaroTex-312' seed are available for research purposes from Crosby at the Vegetable and Fruit Improvement Center at Texas A&M University.

Source: http://www.sciencedaily.com

Translational genomics for crop breeding

The *Genomics Applications in Crop Improvement* (two volume set) brings together a diverse field of international experts in plant breeding genomics to share their experiences in the field, from success stories to lessons learnt.

In recent years advances in genetics and genomics have greatly enhanced our understanding of the structural and functional aspects of plant genomes. Several novel genetic and genomics approaches such as association genetics, advanced back-cross QTL analysis, allele mining, comparative and functional genomics, transcriptomics, proteomics, etc. offer unprecedented opportunities to examine crop genetic variation and utilize this variability for breeding purposes. Enhancing the prediction of the phenotype from a genotype using genomics tools is referred to as 'genomics-assisted breeding'.

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Next-generation sequencing: Current technologies and applications

High-throughput, next-generation sequencing (NGS) technologies are capable of producing a huge amount of sequence data in a relatively short time and have revolutionized genome research in recent years. The powerful and flexible nature of NGS has made it an indispensable tool for a broad spectrum of biological sciences and NGS technologies have transformed scientific research in many fields.

Written by experts from around the world, this book explores the most recent advances in NGS instrumentation and data analysis. The book begins with a comprehensive description of current NGS platforms, their sequencing chemistries, instrument specifications, and general workflows and procedures. A separate chapter is dedicated to low-quantity, single molecule sequencing technology. Practical and cutting-edge, this volume represents an excellent collection of chapters to aid all scientists who wish to apply these innovative research tools.

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BIOTECHNOLOGY CLUB MEMBERSHIP APPLICATION FORM

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Annual ☐ **Life** ☐ **Code** ☐

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		Annual	Life	Annual	Life
I	Individuals	3,400	34,000	220.00	2,200
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C	Corporate Members	4,500	45,000	330.00	3,300

The above membership fee inclusive of service tax@12.36%

I/We enclose a Demand Draft No. ..... for Indian Rs / US$ ..... 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

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