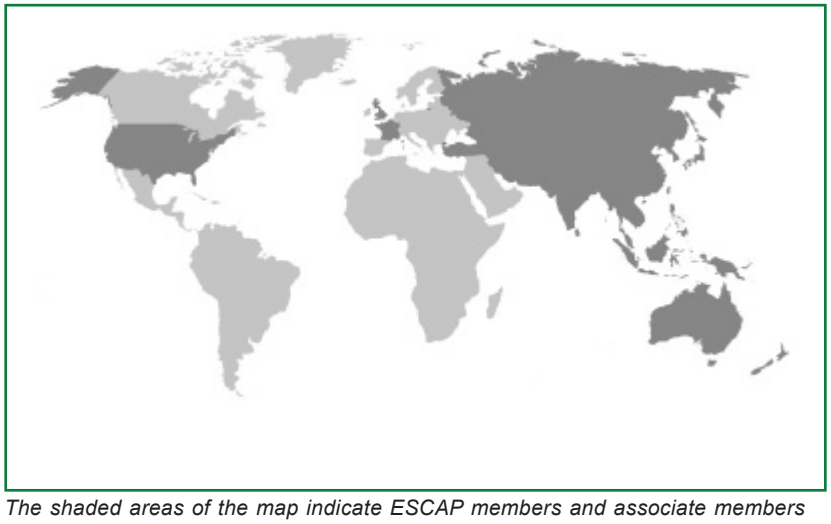
The **Asian and Pacific Centre for Transfer of Technology (APCTT)**, a subsidiary body of ESCAP, was established on 16 July 1977 with the objectives: to assist the members and associate members of ESCAP through strengthening their capabilities to develop and manage national innovation systems; develop,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

The protrusion of a neuron without Dscam protein (green) and that of a neuron with an abnormally high level of Dscam protein (red). The protrusions are overlaid on the fruitfly's equivalent of the human spinal cord (blue).

(Credit: Xin Wang, University of Michigan, USA)

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*** Value Added Technology Information Services**

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Experts call for effective stem cell treatment regulation

Medical experts have given a call for more effective regulation of stem cell treatments research, so that the cutting-edge technology for treating serious health conditions, such as cancers, Parkinson's disease, and diabetes, could develop more healthily in China. At a conference as part of the Global Healthcare Services of the China Beijing International Fair for Trade in Services, medical professionals, government officials and businessmen recently discussed the challenges of China's stem cell research.

"Stem cell treatment research in China faces a dilemma. If the government loosens regulation, many illegal practices will occur. But if the government tightens the regulation, many research projects have to be suspended", explains Lu Shibi, an academician of the Chinese Academy of Engineering, also a famous orthopedic specialist who pioneers stem cell therapy research. "That is because the current regulation issued by health authorities on stem cell therapy research is not up to date," Lu says.

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

A novel device for patient transfer

A novel, low cost "Patient Transfer Device" has been developed under the Stanford India Biodesign (SIB) Programme by a multidisciplinary team of SIB fellows and interns comprising clinicians, engineers and designers under the guidance of faculty from All India Institute of Medical sciences (AIIMS). It is a programme of the Department of Biotechnology (DBT), Ministry of Science and Technology, Government of India implemented at AIIMS, and Indian Institute of Technology (IIT), Delhi in collaboration with the Stanford University, USA and Indo-US Science and Technology Forum, New Delhi. Biotechnology Consortium of India Limited (BCIL) has been engaged by DBT as the management agency of this programme. Dr. Mansi Agrawal, Mr Shitij Malhotra, Ms. Pooja Singh, Mr. Nishith Chasmawala, Mr. Amit Sharma, Dr Praveen Agarwal, AIIMS, Dr Shiv Chowdhary, AIIMS, Dr Mahesh Chandra Mishra, AIIMS and Dr Chandralekha, AIIMS are the inventors in this research.

Patient transfer device is an innovative device for effortless transfer of patient from one bed to other, without lifting the patient. It is a disposable fabric based solution that requires only one to two caregivers and reduces transfer time directly by half. It also prevents injuries to the caretakers and patients.

Source: http://www.biospectrumindia.com

WHO launches Global Hepatitis Network

The World Health Organization (WHO) has officially launched the Global Hepatitis Network, a major new international collaboration for the prevention and control of viral hepatitis at a press conference at APASL Liver Week in Singapore. The Coalition to Eradicate Viral Hepatitis in Asia Pacific (CEVHAP) claims that it is ideally placed to support the work of the Global Hepatitis Network in Asia Pacific, and is in the process of applying for membership. A major focus for the Global Hepatitis Network will be to work on activities that strengthen international collaboration around WHO's Framework for the Prevention and Control of Viral Hepatitis, which is focused on four distinct axes:

- Axis 1: Raising awareness, promoting partnerships and mobilizing resources
- Axis 2: Evidence-based policy and data for action
- Axis 3: Prevention of transmission
- Axis 4: Screening, care and treatment

Professor Ding-Shinn Chen, Chair of CEVHAP commented, "The Global Hepatitis Network represents an excellent opportunity for greater collaboration between governments and expert groups, and will we hope to mobilize resources that are urgently needed. The launch of the Network reflects the growing recognition that viral hepatitis is as serious a global threat as HIV, TB and malaria, something that is crucially important to elevate attention and drive action." The WHO will provide secretariat support to the Global Hepatitis Network, with a chair and steering committee overseeing a number of regional and technical working groups.

Professor Stephen Locarnini, Joint Secretary of CEVHAP and Director of the WHO Regional Reference Laboratory for Hepatitis B at the Victorian Infectious Diseases Reference Laboratory (VIDRL) welcomed the news saying "We applaud the leadership of WHO's Global Hepatitis Programme in forming this network. As a WHO Regional Reference Laboratory in the region, VIDRL have already learned the power of international collaboration and this new network demonstrates the important progress and resource commitment being made by WHO."

Source: http://healthcare.financialexpress.com

New R&D center to advance rice research in Japan

The agriculture ministry of Japan will set up a center to develop rice strains, using genetic studies, that are flavorful but disease-resistant varieties, to meet local needs.

Though, conventional methods to develop new varieties take around 12 years on an average, it is possible to develop such varieties in four-to-five years by adopting DNA marker selective breeding method. Development of such rice varieties starts with growing a significant number of crossbred strains, which after harvest are sampled for researchers to understand the properties of a new variety. A strain under development is also crossbred with original varieties repeatedly to eliminate unwanted characteristics that are retained during crossbreeding. DNA marker selective breeding enables researchers to analyze the genetic code of crossbred strains and identify those that inherited only useful genes, which can further be cultivated. The government has already spent $500 million and identified 140 genes, like those that can make rice more resistant to cold weather or produce more grains.

Source: http://www.biospectrumasia.com

World's most powerful microscope ready for use

The seven-tonne, 4.5-meter tall Scanning Transmission Electron Holography Microscope, STEHM, the first such microscope of its type in the world, came to the University of Victoria, Canada in parts in 2012. The STEHM was specially built in Japan for UVic by Hitachi High Technologies Canada. The microscope resides in a specially constructed room at the Dr. Rodney Herring, a professor of mechanical engineering and director of UVic's Advanced Microscopy Facility viewed gold atoms through the microscope at a resolution of 35 picometer. This resolution is much better than the previous best image with 49- picometer resolution taken at the Lawrence Berkley National Laboratory in California, and is about 20 million times human sight. The STEHM allows researchers to see the atoms in a manner never before possible.

Source: http://www.biospectrumasia.com

Development of photo-sensitive drugs underway

The scientific cooperation between chemists, biotechnologists and physicists from various Catalan institutes, headed by Pau Gorostiza, from the Institute for Bioengineering of Catalonia (IBEC), and Ernest Giralt, from the Institute for Research in Biomedicine (IRB Barcelona), has led to a breakthrough, published in *Angewandte Chemie*, which will favor the development of light-regulated therapeutic molecules. The Italian scientist Laura Nevola, postdoctoral researcher who works in Dr. Giralt's lab, and Andrés Martín-Quirós, a PhD student with Dr. Gorostiza's lab, co-authors of the study, have spent four years working on the design of photo-sensitive peptides. "Photo-sensitive peptides act like traffic lights and can be made to give a green or red light for cell endocytosis. They are powerful tools for cell biology," explains Dr. Giralt.

Dr. Gorostiza of the University of California, Berkeley, USA, was the person to come up with the idea of manipulating biological and pharmacological processes through the use of light after spending five years specializing in this field. He says, "This first breakthrough will allow us to generate the same kind of peptides for chemical-medical applications," According to the scientists involved in this project, "the most immediate therapeutic applications we can expect is for diseases affecting superficial tissue such as the skin, the retina and the most external mucosal membranes."

Source: http://www.sciencedaily.com

DNA constructs antenna for solar energy

A research team at Chalmers University of Technology, Sweden, has made a nanotechnological breakthrough in the first step required for artificial photosynthesis. The team has demonstrated that it is possible to use self-assembling DNA molecules as scaffolding to create artificial systems that collect light. The results were recently published in the esteemed scientific *Journal of the American Chemical Society*.

Scaffolding in plants and algae consists of a large number of proteins that organize chlorophyll molecules to ensure effective light collection. The system is complicated and would basically be impossible to construct artificially. If DNA is used to organize the light-collecting molecules, the same precision is not achieved but a dynamic self-constructing system arises. If any of the light-collecting molecules break, it will be replaced with another one almost immediately. In this sense, it is a self-repairing system as opposed to if molecules had been put there by researchers with synthetic organic chemistry. The sun's light is moved to a reaction center in plants and algae so they can synthesize sugars and other energy-rich molecules.

The Chalmers researchers are combining artificial photosynthesis with DNA nanotechnology. As long as the correct assembly instructions are given from the start, DNA strands in a test tube can bend around each other and basically form any structure.

Source: http://www.sciencedaily.com

Celgene, MorphoSys strike deal on blood cancer drug

Celgene Corp. (CELG), USA, has made a move to solidify its future in the multiple myeloma space, inking a licensing deal with Germany's MorphoSys AG for its MOR202 drug that could be worth $818 million to MorphoSys. Munich-based MorphoSys gets an up-front license fee of 70.8 million Euros ($92 million) and Celgene will purchase $60 million worth of new shares of the company, the parties said. The transaction must be cleared by U.S. antitrust authorities under the Hart-Scott-Rodino Act. The price of shares will be determined following that clearance. It will include a premium of at least 15% of the closing price of the shares prior to the parties signing the agreement. Total value of the transaction could hit $818 million for MorphoSys, which may be entitled to additional development, regulatory and sales milestones plus tiered double-digit royalties on net sales outside a co-promotion territory. Celgene secures worldwide rights to MOR202 while sharing the rights with MorphoSys to co-promote the drug candidate in Europe if it is approved there. MorphoSys retains 50-50 profit sharing in its co-promotion territory.

MOR202 is a fully human monoclonal antibody targeting CD38 and is in development to treat MM and leukemias. It is now in a Phase 1/2a trial in patients with relapsed/refractory MM. MorphoSys and Celgene will share in the costs of development of the mAb for MM and other indications, with MorphoSys paying one-third of the costs and Celgene two-thirds.

Patients continue to need new options for treatment of the disease, said Mark Alles, executive vice president and global head of hematology and oncology at Celgene. "Strategic investments in next-generation medical innovation make it possible for physicians to turn incurable cancers like MM into chronic, more manageable diseases."

Source: http://www.thestreet.com

AmVac bags €11m funding

Swiss vaccine developer AmVac AG has bagged EU funding in two FP7 projects worth €5.5m and €6m. Funds provided under the FP7 programme only require a 25% contribution in kind by small and medium-size companies such as AmVac. 'It is an excellent opportunity to leverage our investments and create significant potential for patients and investors — even more so, as both projects are expected to complete first clinical trials within the funding periods,' Melinda Karpati, CEO of AmVac comments.

The projects aim to develop innovative vaccines against flu and leishmaniasis including Phase I safety testing. The first one of the 5-year projects is aimed at developing a universal flu vaccine that can be used over several years. The second project targets leishmaniasis, an infectious disease transmitted by certain species of sand fly. It is found in parts of the tropics, subtropics and southern Europe. Currently, there is no vaccine available. A first-in-class vaccine could not only protect the local population but also tourists travelling to endemic regions. AmVac will support pre-clinical testing and manufacturing according to GMP standards.

Source: http://www.eurobiotechnews.eu

Approval of first two monoclonal antibody biosimilars

The European Medicines Agency's Committee for Medicinal Products for Human Use (CHMP) has recommended granting of marketing authorisations for the first two monoclonal antibody biosimilars.

Remsima and Inflectra both contain the same known active substance, infliximab, and are recommended for authorization in the same indications as Remicade, covering a range of autoimmune diseases such as rheumatoid arthritis, Crohn's disease, ulcerative colitis, ankylosing spondylitis, psoriatic arthritis and psoriasis. Monoclonal antibodies are structurally complex substances that can locate and bind to specific molecules, in the case of infliximab to tumour necrosis factor (TNF) alpha, a protein promoting inflammatory response, which causes many of the clinical problems associated with autoimmune disorders. It is the first time that the biosimilar concept has been successfully applied to such a complex molecule, resulting in the recommended approval of a biosimilar version of infliximab.

Source: http://www.fiercebiotech.com

Covance expands Singapore Central Laboratory

Covance Inc., USA, a leading provider of drug development services, announced the completion of the expansion of its central laboratory facility in Singapore. The laboratory, at approximately 2,700 sq m, is the largest of its kind in Singapore and is Covance's third-largest central laboratory after two others in Indianapolis and Geneva. This

laboratory expansion doubles the size of Covance's genomics footprint in Singapore, while adding capabilities in anatomic pathology and nutritional chemistry. Covance will continue to provide a full-service offering that includes chemistry, immunology, hematology, flow cytometry, genomics, anatomic pathology, and microbiology.

Covance has been providing central laboratory testing services in Singapore for the last 13 years. There is an increasing demand for efficient, high-quality clinical trial data and support, So this expansion will help Covance better serve both local and multinational customers' R&D needs in key therapeutic areas like oncology and metabolic diseases.

Source: http://www.edb.gov.sg

NEOMED and AstraZeneca Canada broaden strategic alliance

NEOMED, USA, and AstraZeneca, Canada, have announced the expansion of their strategic partnership, further enabling NEOMED's mission of delivering novel therapeutic solutions for unmet medical needs. AstraZeneca will provide NEOMED access to up to 250,000 high-quality compounds from its small molecule compound library to be used to identify candidate compounds for selected targets. The goal is to identify compounds that could potentially become new medicines for a broad range of diseases. Under the terms of the agreement, NEOMED will work with academic researchers and AstraZeneca scientists to identify active compounds and progress them into pharmaceutical lead candidates to achieve *in vivo* proof-of-concept, one of the key steps in developing new medicines. Using *High Throughput Screening*, initial chemical starting points (hits) for innovative targets emerging from academic research will be identified from this compound collection. This step will be performed by NEOMED's network of partners and collaborators.

Source: http://www.biospace.com

AmpliPhi to develop bacteriophage therapies

AmpliPhi BioSciences Corporation, USA, the leader in the discovery and development of bacteriophage-based therapies to treat drug resistant bacterial infections, announced today a Collaborative Research and Development Agreement (CRADA) with the United States Army Medical Research and Materiel Command (USAMRMC) and the Walter Reed Army Institute of Research (WRAIR).

The CRADA will focus on developing and commercializing bacteriophage therapeutics to treat *Staphylococcus aureus, Escherichia coli,* and *Pseudomonas aeruginosa* infections. The increasing prevalence of antibiotic-resistant bacteria poses a serious threat to public health and military personnel and is a major problem in hospitals and clinics around the world. The initial indication will be wounds and skin infections from S *aureus*, which is the leading pathogen in healthcare-associated infections in the United States as a whole, accounting for 30.4% of surgical site infections.

AmpliPhi will retain global regulatory ownership and commercial rights to all products developed as a result of the agreement. USAMRMC will gain access rights to any products developed. WRAIR will be responsible for cGMP production of the lead *Staphylococcus* product, AmpliPhage-002 for Phase 1 and 2 clinical trials at its Bioproduction Facility.

Source: http://uk.finance.yahoo.com

AvantiCell Science forays into Japanese markets

One of Scotland's most successful life science exporting companies, AvantiCell Science, has made a significant breakthrough into Japan, one of its most important target markets. AvantiCell, which already has a lucrative export footprint in Malaysia and China, has just signed a substantial six-figure deal to supply cells to one of the technologically-advanced country's leading pharmaceutical companies. The door-opening contract comes as a result of a sustained and focused marketing push into Japan, which is recognized as one of the most difficult arenas for smaller companies to gain a foothold. The Japanese excursion is in line with AvantiCell's long-term sales development strategy, which has seen most of its activities focused on exports, initially to Europe and latterly to the booming Far Eastern markets.

The company has established a niche by isolating primary cells from human and animal tissue. The attraction to researchers and analysts worldwide is that primary cells retain a biological memory of the tissue they came from. This means that, when grown in a culture dish, they mimic what happens in the body, and so can be used to test predictively a whole range of materials. This allows researchers to make informed decisions about the likelihood of failure or success at an early stage in the development process.

Source: http://www.biospace.com

How cells control the direction in which the genome is read

Biologists from Massachusetts Institute of Technology (MIT), USA, led by Professor Phillip Sharp reveal how cells control the direction in which the genome is read. They have discovered a mechanism that allows cells to read their own DNA in the correct direction and prevents them from copying most of the so-called "junk DNA" that makes up long stretches of our genome. Only about 15 percent of the human genome consists of protein-coding genes. The research team comprised graduate students Albert Almada and Xuebing Wu, who are the lead authors of the paper. Christopher Burge, a professor of biology and biological engineering, and undergraduate Andrea Kriz are also authors. In a new paper appearing in *Nature* on June 23, Sharp and colleagues describe how cells initiate but then halt the copying of RNA in the upstream, or non-protein-coding direction, while allowing it to continue in the direction in which genes are correctly read.

DNA controls cellular activity by coding for the production of RNAs and proteins. When the DNA double helix unwinds to reveal its genetic messages, RNA transcription can proceed in either direction. To initiate this copying, an enzyme called RNA polymerase latches on to the DNA at a spot known as the promoter. The RNA polymerase then moves along the strand, building the mRNA chain as it goes. When the RNA polymerase reaches a stop signal at the end of a gene, it halts transcription and adds to the mRNA a sequence of bases known as a poly-A tail, which consists of a long string of the genetic base adenine. This process, known as polyadenylation, helps to prepare the mRNA molecule to be exported from the cell's nucleus.

The researchers discovered that polyadenylation also plays a major role in halting the transcription of upstream, noncoding DNA sequences. The function of all of this upstream noncoding RNA is still a subject of much investigation. Professor Sharp's lab is now exploring the relationship between this transcription process and the observation of large numbers of so-called long noncoding RNAs (lncRNAs). He plans to investigate the mechanisms that control the synthesis of such RNAs and try to determine their functions.

Source: http://web.mit.edu

Processing of nanoparticles and their drug payloads

Daniel Anderson, the Samuel Goldblith Associate Professor of Chemical Engineering at Massachusetts Institute of Technology (MIT), USA, also a member of MIT's Koch Institute for Integrative Cancer Research and MIT's Institute for Medical Engineering and Science, along with Robert Langer, the David H. Koch Institute Professor at MIT, examined how the nanoparticles and their drug payloads are processed at a cellular and subcellular level. Their findings appear in the June 23 issue of *Nature Biotechnology*. Nanoparticles that deliver short strands of RNA offer a way to treat cancer and other diseases by shutting off malfunctioning genes. Although this approach has shown some promise, scientists are still not sure exactly what happens to the nanoparticles once they get inside their target cells. A new study from MIT sheds light on the nanoparticles' fate and suggests new ways to maximize delivery of the RNA strands they are carrying, known as short interfering RNA (siRNA).

The researchers found that once cells absorb the lipid-RNA nanoparticles, they are broken down within about an hour and excreted from the cells. They also identified a protein called Niemann Pick type C1 (NPC1) as one of the major factors in the nanoparticle-recycling process. Without this protein, the particles could not be excreted from the cells, giving the siRNA more time to reach its targets. "In the absence of the NPC1, there's a traffic jam, and siRNA gets more time to escape from that traffic jam because there is a backlog," says Gaurav Sahay, an MIT postdoc and lead author of the *Nature Biotechnology* paper. The researchers are looking for other factors involved in nanoparticle recycling that could make good targets for possibly slowing down or blocking the recycling process, which they believe could help make RNA interference drugs much more potent.

Source: http://web.mit.edu

Genomes, RNA of domestic and wild tomatoes compared

Researchers in the U.S., Europe, and Japan have produced the first comparison of both the DNA sequences and which genes are active, or being transcribed, between the domestic tomato and its wild cousins. Julin Maloof, professor of plant biology in the College of Biological Sciences at the University of California, Davis (UC Davis), USA, is the senior author on the study, published June 24 in the journal *Proceedings of the National Academy of Sciences*. Breeding new traits into tomatoes often involves crossing them with

wild relatives. The new study shows that a large block of genes from one species of wild tomato is present in domestic tomato, and has widespread, unexpected effects across the whole genome. Among other findings, genes associated with fruit color showed rapid evolution among domesticated, red-fruited tomatoes and green-fruited wild relatives. Gene-expression profiling, combined with an understanding of the plants' biology, allows researchers to understand how genes interact to create complex phenotypes, said Neelima Sinha, professor of plant biology at UC Davis and co-author on the paper.

Source: http://www.alphagalileo.org

Clones of clones can make clones

Since the first reports of successful cloning of mammals by somatic cell nuclear transfer (SCNT), concerns have been raised about the efficiency and repeatability of cloning techniques, and the health of cloned offspring. Although it has been showed since the early 2000s that cloned animals can themselves be cloned, the efficiency of SCNT appeared to taper with each successive generation, leading some to speculate that there might be an inherent limit to cloning from clones due to the accumulation of genetic errors. A new report by the Laboratory for Genomic Reprogramming (Teruhiko Wakayama, Team Leader) shows that mice can be cloned successively for at least 25 generations. Published in *Cell Stem Cell*, this work by Wakayama, now at the University of Yamanashi, Japan, suggests that there is no inherent limit to SCNT repeatability, given sufficiently efficient methods. This is in sharp contrast to the hitherto understanding of the limitation of cloning process that the efficiency of SCNT appeared to taper with each successive generation, leading some to speculate that there might be an inherent limit to cloning from clones due to the accumulation of genetic errors.

During their lengthy investigation, which gave rise to more than 500 viable cloned offspring, the team examined whether complete matching of donor nuclei with recipient oocytes would boost efficiency, but they found that even microinjection of donor somatic nuclei into oocytes from the same animal did not result in a higher success rate, suggesting that, in principle, heterogeneous donors are equally capable of giving rise to clones. One key element of the cloning technique appears to be the addition of a reagent known as trichostatin A to the cell medium, which has previously been shown to raise SCNT efficiency by approximately double. In G20 cloning efforts, the team compared SCNT with and without trichostatin, and found that the effect on reprogramming remained the same. "This series of experiments is exciting because it reveals how, with the right techniques, clones can continue to be made even after the death of the original donor animal," says Wakayama.

Source: http://phys.org

Thirdhand smoke causes DNA damage

A study published in a research paper titled "Thirdhand smoke causes DNA damage in human cells," in the journal *Mutagenesis*, led by researchers from Lawrence Berkeley National Laboratory, USA, has found for the first time that thirdhand smoke — the noxious residue that clings to virtually all surfaces long after the secondhand smoke from a cigarette has cleared out — causes significant genetic damage in human cells. Bo Hang, a biochemist in the Life Sciences Division of Berkeley Lab is the lead investigator in this study. He worked with an interdisciplinary group, including chemists from Berkeley Lab's Environmental Energy Technologies Division — Gundel, Hugo Destaillats and Mohamad Sleiman — as well as scientists from the University of California, San Francisco, University of California, Los Angeles, Medical Center and the University of Texas, USA. "This is the very first study to find that thirdhand smoke is mutagenic," said Lara Gundel, a Berkeley Lab scientist and co-author of the study. "Tobacco-specific nitrosamines, some of the chemical compounds in thirdhand smoke, are among the most potent carcinogens there are. They stay on surfaces, and when those surfaces are clothing or carpets, the danger to children is especially serious."

It is the first major study of disease-related mechanisms to come out of the California Consortium on the Health Effects of Thirdhand Smoke, which was established two years ago largely as a result of work published in 2010 by Gundel, Destaillats, Sleiman and others. The Consortium is funded by the Tobacco-Related Disease Research Program, which is managed by the University of California, United States, and funded by state cigarette taxes.

The 2010 studies from Berkeley Lab found that residual nicotine can react with ozone andnitrous acid — both common indoor air pollutants — to form hazardous agents. When nicotine in thirdhand smoke reacts with nitrous acid it undergoes a chemical transformation and forms carcinogenic tobacco-specific nitrosamines, such as NNA, NNK and NNN. Nicotine can react with ozone to form ultrafine

particles, which can carry harmful chemicals and pass through human tissue. Humans can be exposed to thirdhand smoke through inhalation, ingestion or skin contact.

Thirdhand smoke is particularly insidious because it is extremely difficult to eradicate. Studies have found that it can still be detected in dust and surfaces of apartments more than two months after smokers moved out. Common cleaning methods such as vacuuming, wiping, and ventilation have not proven effective in lowering nicotine contamination. Now the new study suggests thirdhand smoke could become more harmful over time.

The researchers conclude in their paper: "Ultimately, knowledge of the mechanisms by which thirdhand smoke exposure increases the chance of disease development in exposed individuals should lead to new strategies for prevention."

Source: http://newscenter.lbl.gov

DNA found outside genes plays vital roles

A new study at the University of California, San Francisco, USA, by the senior author and RNA expert Michael McManus, associate professor of microbiology and immunology and a member of the University of California, San Francisco, United States, Diabetes Center, graduate student Ian Vaughn, and postdoctoral fellow Matthew Hangauer, identified thousands of previously unknown, unique RNA sequences. The study highlights the potential importance of the vast majority of human DNA that lies outside of genes within the cell. The researchers found that about 85 per cent of these stretches of DNA make RNA The study, published in the free online journal *PLOS Genetics* on June 20, 2013, is one of the most extensive examinations of the human genome ever undertaken to see which stretches of DNA outside of genes make RNA and which do not. The researchers identified thousands of previously unknown, unique RNA sequences. Today, scientists estimate that only 1.5 percent of the genome consists of genes, McManus said. But over the last two decades other kinds of RNA have been identified that are transcribed from DNA outside of gene regions. Some of these RNA molecules play important biological roles, but scientists debate whether few or most of these RNA molecules are likely to be biologically significant. So far, only a handful of lincRNA molecules are known to play significant roles in human biology, McManus said.

The research was funded by the NIH Human Epigenome Atlas Reference Epigenome Mapping Center, by a National Institutes of Health Bay Area Cancer Target Discovery and Development Network grant, by a PBBR New Frontier Research Award (UCSF), and by a Susan G. Komen Search for The Cure Postdoctoral Fellowship.

Source: http://www.newswise.com

Genes in birth defects may lead to mental illness

Researchers led by psychiatrist Benjamin Cheyette in the University of California, San Francisco, USA, along with John Rubenstein, and colleagues in University of California, San Francisco's Nina Ireland Laboratory of Developmental Neurobiology found that the genetically altered interneurons appeared relatively normal and had managed to find their proper position in the brain's circuitry during development. But the cells had significantly fewer synapses, the sites where communication with neighboring neurons takes place. In addition, observations not included in the new paper, the team also noted that the cells' dendrites — fine extensions that normally form bushy arbors studded with synapses — were poorly developed and sparsely branched. Their study has been published in the June 24 online issue of *PLOS ONE*.

"Neurological illnesses tend to be focal, with lesions that you can identify or pathology you can see on an imaging study," Cheyette explained. "Psychiatric illnesses? Not so much. The differences are really subtle and hard to see."

The Dact1 protein is part of a fundamental biological system known as the Wnt (pronounced "wint") signaling pathway. Interactions among proteins in the Wnt pathway orchestrate many processes essential to life in animals as diverse as fruit flies, mice and humans, including the proper development of the immensely complex human nervous system from a single fertilized egg cell.

One way the Wnt pathway manages this task is by maintaining the "polarity" of cells during development, said Cheyette, "a process of sequestering, increasing the concentration of one set of proteins on one side of the cell and a different set of proteins on the other side of the cell." Polarity is particularly important as precursor cells transform into nerve cells, Cheyette said, because neurons are "the most polarized cells in the body," with specialized input and output zones that must wind up in the proper spots if the cells are to function normally.

Source: http://www.ucsf.edu

How a mutated protein outwits evolution and fuels leukemia

Dr. Iannis Aifantis at the New York University Langone Medical Center, USA, along with fellow researcher Bryan King, have discovered the survival secret to a genetic mutation that stokes leukemia cells, solving an evolutionary riddle and paving the way to a highly targeted therapy for leukemia. In a paper published in *Cell*, the researchers describe how a mutated protein, called Fbxw7, behaves differently when expressed in cancer cells versus healthy cells. The Fbxw7 protein regulates the production of so-called hematopoietic stem cells, precursors that give rise to all types of blood cells. Without Fbxw7, the body loses the ability to produce blood and eventually succumbs to anemia.

In the follow-up experiments, the researchers showed that Fbxw7 binds to and degrades a protein called Myc, which fuels leukemic stem cells, and has long been associated with many other cancers and the recurrence of cancer after treatment. When Fbxw7 is mutated, Myc is left unchecked, they found, and the population of cancer stem cells swells. This insight also helps explain why healthy blood stem cells seem to "ignore" mutated Fbxw7. Unlike leukemic stem cells, healthy blood stem cells typically lie dormant until the body requires an emergency supply of blood and they rarely express Myc.

Source: http://communications.med.nyu.edu

NMR advance brings proteins into the open

A key protein interaction, common across all forms of life, had eluded scientists' observation until a team of researchers cracked the case by combining data from four different techniques of nuclear magnetic resonance spectroscopy. Brown University, USA, biologist Nicolas Fawzi, who was a postdoctoral researcher in the group of Marius Clore at the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) within the National Institutes of Health (NIH), worked with co-authors and NIDDK researchers David Libich, Jinfa Yang and Marius Clore to piece together the story of the proteins by combining four different NMR techniques. They figured out what each one could tell them about the interaction and built the case. They reported their findings in *Proceedings of the National Academy of Sciences* (PNAS).

NMR is capable of sensing the interactions and kinetics of protein handshakes as they occur, but in some cases any single technique can provide only hints and whispers of what's going on. The NMR techniques they used were lifetime line broadening, Carr-Purcell-Meinboom-Gill (CPMG) relaxation dispersion spectroscopy, and exchange-induced chemical shifts.

"By using four techniques together we were able to extract information about the structure of the protein while it binds as well as how fast it comes on and off and what it's doing at each position," Fawzi said. "Instead of forming more particular structure upon binding it appears to retain great conformational heterogeneity."

The lifetime line broadening technique, for example, told them that the Aβ was interacting with something big (GroEL), while the CPMG and chemical shift observations combined to show the length of time Aβ spent on GroEL before unbinding, as well as the structural details of Aβ when it was bound to GroEL. DEST provided information that could confirm much of the story of the other techniques. For molecular and structural biologists, the newly proven blend of NMR techniques could open a number of other cold cases of elusive interactions.

Source: http://news.brown.edu

A protein linked to cognitive decline in Alzheimer's identified

In a recent publication in *Nature Communications*, researchers, Julio Pozueta, Roger Lefort, Elena M. Ribe, Carol M. Troy, Ottavio Arancio, and Michael Shelanski, at Columbia University Medical Center (CUMC), the United States, have demonstrated that a protein called caspase-2 is a key regulator of a signaling pathway that leads to cognitive decline in Alzheimer's disease.

One of the earliest events in Alzheimer's is disruption of the brain's synapses (the small gaps across which nerve impulses are passed), which can lead to neuronal death. Although what drives this process has not been clear, studies have indicated that caspace-2 might be involved. Other researchers have shown that caspase-2 also contributes to the maintenance of normal synaptic functions. Dr. Shelanski and his team hypothesized that aberrant activation of caspase-2 may cause synaptic changes in Alzheimer's disease.

Source: http://newsroom.cumc.columbia.edu

The protein profile of restless leg syndrome

A protein profile of people with restless leg syndrome (RLS) identifies factors behind disrupted sleep, cardiovascular dysfunction and pain finds research in BioMed Central's open access journal *Fluids and Barriers of the CNS*. The research that was carried out by Dr Stephanie Patton from Penn State University, USA,

gives insights into the disorder, and could be useful in the development of new treatments. Restless leg syndrome (RLS), also known as Willis Ekbom disease (WED), is believed to be associated with iron deficiency in the brain, kidney failure, or low levels of dopamine. It can also occur during pregnancy. It affects between 5 and 10% of the population. It is also a risk factor for cardiovascular disease.

Researchers studied the cerebral spinal fluid (CSF) of women with and without RLS, and discovered there was a significantly altered level of six specific proteins with RLS. These proteins include a protein which transports vitamin D into cells and is involved in the regulation of dopamine levels, cystatin C a biomarker for pain found in people with sciatica and during labor, and a neuromodulator (PTGDS) known to be involved in sleep disturbances.

Source: http://www.alphagalileo.org

Developmental protein plays role in spread of cancer

A protein used by embryo cells during early development, and recently found in many different types of cancer, apparently serves as a switch regulating the spread of cancer, known as metastasis, report researchers Thomas Kipps, Evelyn and Edwin Tasch at the University of California, San Diego School of Medicine and UC San Diego Moores Cancer Center, the United States. Their findings were reported in the June 15, 2013 issue of the journal *Cancer Research*.

The scientists, discovered an association between the protein, called Receptor-tyrosine-kinase-like Orphan Receptor 1 or ROR1, and the epithelial-mesenchymal transition (EMT), a process that occurs during embryogenesis when cells migrate and then grow into new organs during early development. In their latest work, the scientists found that high-level expression of ROR1 in breast cancer cells correlates to higher rates of relapse and metastasis in patients with breast adenocarcinoma, a type of cancer that originates in glandular tissue. Because ROR1 is expressed only in cancer cells, Kipps' team says it presents a singular, selective target for anti-cancer therapies that would leave normal cells unaffected. The researchers are developing a humanized monoclonal antibody for potential clinical studies in patients with cancers that express ROR1.

Source: http://ucsdnews.ucsd.edu

Study identifies protein essential for normal heart function

Protein being studied to fight cancer; may cause toxicity in cardiac cells. A study by researchers at Skaggs School of Pharmacy and Pharmaceutical Sciences and the Department of Pharmacology at the University of California, the United States, shows that a protein called MCL-1, which promotes cell survival, is essential for normal heart function.

While MCL-1 is up regulated in a number of human cancers, contributing to the overgrowth of cancer cells, it is found at high levels in normal heart tissue.

The study demonstrated that the loss of MCL-1 led to rapid dysfunction of mitochondria, impaired autophagy — a process which deals with mitochondrial maintenance and is normally induced by myocardial stress — and heart failure, even in the absence of cardiac stress. By compromising both autophagy and mitochondrial function, MCL-1 inhibitors are likely to affect the cells' energy supply.

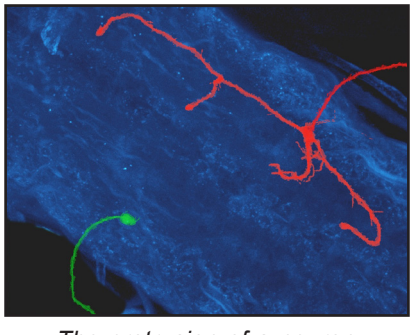
Source: http://ucsdnews.ucsd.edu

Targeting an aspect of Down syndrome

University of Michigan, United States, researcher Bing Ye, a faculty member at the Life Sciences Institute, Jung Hwan Kim, Xin Wang and Rosemary Coolon of the Life Sciences Institute and the Department of Cell and Developmental Biology carried out the study to determine how a gene that is known to be defective in Down syndrome is regulated and how its dysregulation may lead to neurological defects, providing insights into potential therapeutic approaches to an aspect of the syndrome. The research was supported by the National Institutes of Health, Whitehall Foundation and Pew Scholars Program in the Biological Sciences. The study is published online in *Neuron*.

Normally, nerve cells called neurons undergo an intense period of extending and branching of neuronal protrusions around the time of birth. During this period, the neurons produce the proteins of the gene called Down syndrome cell-adhesion molecule, or Dscam, at high levels. After this phase, the growth and the levels of protein taper off. However, in the brains of patients with Down syndrome, epilepsy and several other neurological disorders, the amount of Dscam remains high.

Source: http://www.ns.umich.edu



The protrusion of a neuron

Study shows heart failure survivors at greater risk for cancer

Heart failure patients are surviving more often with the heart condition but they are increasingly more likely to be diagnosed with cancer, a trend that could be attributed to increased surveillance, side effects of treatments, or other causes, according to a study published online today in the *Journal of the American College of Cardiology*.

Researchers, led by Dr. Veronique Roger, director of the Mayo Clinic Center for the Science of Health Care Delivery, USA conducted the study using medical records from the Rochester Epidemiology Project, which links the inpatient and outpatient records from all providers used by the population of Olmsted County, Minn. The study included 596 patients with heart failure paired with the same number of similar healthy subjects. Investigators stress the importance of the findings in the treatment and management of heart failure, concluding patients should be monitored closely for signs of cancer.

Source: http://www.eurekalert.org

Researchers strike gold with nanotech vaccine

Scientists in the United States have developed a novel vaccination method that uses tiny gold particles to mimic a virus and carry specific proteins to the body's specialist immune cells. The technique differs from the traditional approach of using dead or inactive viruses as a vaccine and was demonstrated in the lab using a specific protein that sits on the surface of the respiratory syncytial virus (RSV). The results have been published today, 26 June 2013, in IOP Publishing's journal *Nanotechnology* by a team of researchers from Vanderbilt University, Tennessee, United States. RSV is the leading viral cause of lower respiration tract infections, causing several hundred thousand deaths and an estimated 65 million infections a year, mainly in children and the elderly.

Lead author of the study, Professor James Crowe, said: "A vaccine for RSV, which is the major cause of viral pneumonia in children, is sorely needed. This study shows that we have developed methods for putting RSV F protein into exceptionally small particles and presenting it to immune cells in a format that physically mimics the virus. Furthermore, the particles themselves are not infectious."

Due to the versatility of the gold nanorods, Professor Crowe believes that their potential use is not limited to RSV.

Source: http://www.iop.org

New gene discovery for babies born with hole in the heart

British Heart Foundation (BHF) Professor Bernard Keavney, from The University of Manchester and Newcastle University, led the research which saw investigators from Newcastle, Nottingham, Oxford and Leicester universities in the United Kingdom, together with colleagues in Europe, Australia and Canada pool resources. The discovery, published in *Nature Genetics*, will help lead to better understanding of why some patients are born with the disorder. The researchers found a relationship between a particular region of the human genome and risk of atrial septal defect (ASD) — a "hole" between the heart's blood-collecting chambers, which they went on to confirm in additional cases of atrial septal defect and healthy controls.

Researchers looked at all the major types of congenial heart disease (CHD), but they did not find a genetic marker common in all types of CHD. Professor Keavney, who is also Cardiovascular Lead at the Manchester Biomedical Research Centre, a partnership between The University and Central Manchester University Hospitals NHS Foundation Trust, added: "Our work also suggests that if we conduct larger studies we will be able to find genes that cause other types of CHD. Although we are not there yet, further studies may enable us to give better genetic counseling to high risk families."

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

Stanford University reverse vaccine to treat diabetes

Stanford University, United States, and Leiden University Medical Center, Netherlands, has developed a 'reverse vaccine' that dampens diabetics' hyperactive immune system, which begins attacking beta cells in the pancreas that produce insulin.

Scientists at Stanford University, United States, and Leiden University Medical Center in the Netherlands, have tested a 'reverse vaccine' that dampens the immune systems of people with type 1 diabetes, which is triggered when a hyperactive immune system begins attacking beta cells in

the pancreas that produce insulin. The results from a small clinical trial with 80 patients were published in *Science Translational Medicine*. The vaccine shuts down the CD8 T cells, which is the part of the immune system that harms the pancreas. Results from a phase I clinical trial on human beings also showed the vaccine switched off some of the hallmarks of the disease. No adverse side effects were observed in any of the patients.

Source: http://www.biospectrumasia.com

"Good" bacteria to battle "Bad" bacteria in eye infections

Much as predators attack their prey in the animal world, there are bacteria that consume and kill other bacteria. Scientists are reporting new progress in putting the predator microbes to work — to attack dangerous bacteria that cause eye infections that lead to blindness and have grown resistant to antibiotics. Daniel Kadouri, an assistant professor of oral biology the University of Medicine and Dentistry of New Jersey-New Jersey Dental School, the United States, is the lead author of the study, which is published in the online journal *PLOS ONE*.

There were three major components to the study. "Taken together, our findings leave us confident that, in isolation, pathogenic bacteria are susceptible to successful attack by predator bacteria, predator bacteria do not appear inherently harmful to ocular cells when applied topically, and a live organism can tolerate the predator bacteria well," says Kadouri. "The time to test all three phenomena simultaneously in the eye tissue of a live organism may now be at hand."

Source: http://www.umdnj.edu

Targeted viral therapy destroys breast cancer stem cells

A promising new treatment for breast cancer, being developed at Virginia Commonwealth University Massey Cancer Center, the United States, and the VCU Institute of Molecular Medicine (VIMM), Virginia, the United States, has been shown in cell culture and in animal models to selectively kill cancer stem cells at the original tumor site and in distant metastases with no toxic effects on healthy cells, including normal stem cells. Cancer stem cells are critical to a cancer's ability to recur following conventional chemotherapies and radiation therapy because they can quickly multiply and establish new tumors that are often therapy resistant.

The study, published in the *International Journal of Cancer*, focuses on a gene originally cloned in the laboratory of primary investigator Paul B. Fisher. The gene, melanoma differentiation associated gene-7 (mda-7), also known as interleukin (IL)-24, has been shown to directly impact two forms of cell suicide known as apoptosis and toxic autophagy, regulate the development of new blood vessels and also play a role in promoting cancer cell destruction by the immune system. In the present study, the researchers used a recombinant adenovirus vector, an engineered virus with modified genetic material, known as Ad.mda-7 to deliver the mda-7/IL-24 gene with its encoded protein directly to the tumor. The researchers found that infection of human breast cancer cells with the adenovirus decreased the proliferation of breast cancer stem cells without affecting normal breast stem cells.

Source: http://wp.vcu.edu

Alzheimer's disease protein controls movement in mice

Researchers in Berlin and Munich, Germany, and Oxford, the United Kingdom, have revealed that a protein, well known for its role in Alzheimer's disease controls spindle development in muscle, leads to impaired movement in mice when the protein is absent or treated with inhibitors. The results, which are published in *The EMBO Journal*, suggest that drugs under development to target the beta-secretase-1 protein, which may be potential treatments for Alzheimer's disease, might produce unwanted side effects related to defective movement.

Alzheimer's disease is the most common form of dementia found in older adults. The World Health Organization estimates that approximately 18 million people worldwide have Alzheimer's disease. The number of people affected by the disease may increase to 34 million by 2025. Drug developers are interested in stopping the Bace1 protein in its tracks because it represents a promising route to treat Alzheimer's disease. If the protein were inhibited, it would interfere with the generation of the smaller damaging proteins that accumulate in the brain as amyloid plaques and would therefore provide some level of protection from the effects of the disease. "Our data indicate that one unwanted side effect of the long-term inhibition of Bace1 might be the disruption of muscle spindle formation and impairment

of movement. This finding is relevant to scientists looking for ways to develop drugs that target the Bace1 protein and should be considered," says Birchmeier. Several Bace1 inhibitors are currently being tested in phase II and phase III clinical trials for the treatment of Alzheimer's disease.

Source: http://www.alphagalileo.org

Virus combination effective against deadly brain tumor

A combination of the myxoma virus and the immune suppressant rapamycin can kill glioblastoma multiforme, the most common and deadliest malignant brain tumor, according to the research by Moffitt Cancer Center, the United States. Peter A. Forsyth, of Moffitt's Neuro-Oncology Program, says the combination has been shown to infect and kill both brain cancer stem cells and differentiated compartments of glioblastoma multiforme.

The finding means that barriers to treating the disease, such as resistance to the drug temozolomide, may be overcome. The study, by Forsyth and colleagues in Canada, Texas and Florida, appeared in a recent issue of *Neuro-Oncology*. "Although our study adds myxoma virus to the list of oncolytic viruses capable of infecting and killing these cells, which strengthens its candidacy for clinical application, our model will need clinical application to determine its safety for patients," concluded the authors. "We expect that intracranial injections of myxoma virus will be safe based on our extensive preclinical work and the demonstrated safety of other oncolytic viruses in clinical trials."

Source: http://www.moffitt.org

Pluripotent stem cells made from pancreatic cancer cells

This first-of-its-kind human-cell model of pancreatic cancer progression was published in *Cell Reports* from the lab of Ken Zaret, professor of Cell and Developmental Biology, Smilow Center for Translational Research, Philadelphia, the United States. "We were able to predict the appearance of cellular features and protein markers in the intermediate stages of pancreatic cancer that are not evident in the terminal stages. This has given us new perspectives into what this deadly type of cancer looks like — something no one has seen before in human cells. Our analysis revealed known molecular networks that are activated during PDAC progression, as well as a new molecular network that is activated during the intermediate stages. This could provide a fresh outlook on biomarkers for early stages of the disease."

Zaret and the first author Jungsun Kim, a postdoctoral associate in the Zaret lab, hypothesized that if human PDAC cells were reprogrammed back to pluripotent cells and then allowed to re-differentiate into pancreatic tissue, they might undergo the early stages of cancer. To do this, they created the PDAC pluripotent cells and indeed found that they recapitulated the early to intermediate stages of pancreatic cancer. They then isolated the cells at the early stage, cultured the cells in vitro, and identified the secreted and released proteins that might serve as early-stage biomarkers of disease progression.

"Using the iPS method, we could only get a cancer cell line from one patient to reprogram, meaning this work is representative of one individual's cancer," noting that his close collaboration with John Hoffman, a surgeon from the Fox Chase Cancer Center (FCCC) was key in order to get fresh cancer cells for the reprogramming. They tried this method with cells from nine human tumors in total. However, as Zaret points out, there are many examples of where a single human cell line has served as a highly useful model for human disease.

"We propose to look in the blood of potential pancreatic cancer patients or relatively early-stage patients for the biomarkers we found downstream of these molecular networks, to see if they are present in people," says Zaret.

This approach allows human cells to be studied directly, as opposed to examining characteristics of pancreatic cancer progression in an animal model and then having to assess whether the findings apply to humans. The cells harvested from the cancer patient were reprogrammed using the four Yamanaka factors carried in a lentivirus, which was adapted by the Zaret lab.

To see what the reprogramming did at a genetic level, the team compared the genomic structure of the early iPS pancreatic cancer cell line to original tumor cells from which the cell line was isolated. They found 23 chromosomal aberrations in the primary tumor cells as compared to 20 of the same chromosomal aberrations in the PDAC iPS line, demonstrating that the PDAC iPS line was derived from the original tumor cells.

"We understand that the pancreatic cancer field has been dogged by searching for unique markers in the blood that detect disease early, and we hope that this live-cell progression approach will gives us a new way to see early molecular markers for pancreatic cancer," says Zaret.

Source: http://www.uphs.upenn.edu

Uncovering quantum secret in photosynthesis

The efficient conversion of sunlight into useful energy is one of the challenges which stand in the way of meeting the world's increasing energy demand in a clean, sustainable way without relying on fossil fuels. Photosynthetic organisms, such as plants and some bacteria, have mastered this process. A pioneering study was carried out by researchers from ICFO—Institute of Photonic Sciences, Barcelona, Spain, in collaboration with biochemists from the University of Glasgow, Scotland, the United Kingdom, to show for the first time at ambient conditions that the quantum mechanisms of energy transfer make photosynthesis more robust in the face of environmental influences. The quantum phenomenon responsible, known as coherence, is manifested in so-called photosynthetic antenna proteins that are responsible for absorption of sunlight and energy transport to the photochemical reaction centers of photosynthesis. The team was led by Niek van Hulst, and the research paper has been published in the journal *Science*.

Source: http://www.eurekalert.org

Black locust showing promise for biomass potential

Researchers from the Energy Biosciences Institute at the University of Illinois, the United States, evaluating the biomass potential of woody crops, are taking a closer look at the black locust (*Robinia pseudoacacia*), which showed a higher yield and a faster harvest time than other woody plant species that they evaluated, said the University of Illinois associate professor of crop sciences Gary Kling. "*Robinia pseudoacacia* is showing great potential as a biomass crop for Midwestern energy production, out-yielding the next closest species by nearly three-fold," Kling said. "We picked the best crops and moved those forward. Other crops may catch up, but black locust was the fastest out of the gate. We will pursue other crops as well for a number of years, but we want to move to the next step which is on to improved selections." "Black locust is effective at colonizing an area, because it freely branches like that," Kling said. "It's a good candidate for this kind of treatment, but not all plants will tolerate this process. It forces the plants to essentially grow up as shrubs, with more frequent harvests. By planting much closer together and causing them to branch like that, you are able to fill up available space, intercept light more quickly, and use the field resources more efficiently."

This spring, a preliminary check on the black locust crops, which included harvesting 3 plants from the edge of the field, produced a yield of 12 to 13 mega grams per hectare (Mg ha-1), which exceeded what was produced over the first two years' growth, Kling said. This rapid growth is what distinguished the black locust from other woody plants in the study. Based on their encouraging findings, Kling said two new experiments were started this spring, through the EBI, both looking at different germplasm for black locust crops.

Source: http://news.aces.illinois.edu

Pistil leads pollen in life-and-death dance

Pollination, essential to much of life on earth, requires the explosive death of the male pollen tube in the female ovule. In new research, Brown University scientists describe the genetic and regulatory factors that compel the male's role in the process. A new paper in *Current Biology* describes the genetically prescribed dance steps of the pollen tube and how their expression destines the tube for self-sacrifice, allowing flowering plants to reproduce. In his lab at Brown University, the United States, Mark Johnson, associate professor of biology, studies the true complexity of intercellular communications that conduct this process with exquisite precision.

Pollen without a gene that codes for a protein called thionin cannot "hear" the pistil's command to explode when their pollen tubes reach the ovule. They just keep growing, coiling inside the ovule and fertilization does not occur. "The moves in the dance between the pollen and the pistil are a back-and-forth [of signals] as the pollen tube is growing. It's quite a dynamic system that happens over the course of a few hours."

In the new paper, Johnson's group, led by third-year graduate student Alexander Leydon, sought to discover what convinces the male pollen tubes to stop growing and burst when they reach the ovule. Scientists have begun to understand the female's commands, but not the male's ability to listen.

Future work, Johnson said, will include tracking down the relevant genes more fully and determining whether thionin is indeed the pollen tube buster that the genes and their MYB-related expression seem to indicate.

The work may also have implications beyond basic science, Johnson said. "Understanding this molecular back-and-forth at all the different levels and stages will be useful to either engineer the process or introduce genetic diversity that will allow the reproductive process to be efficient even in difficult environmental conditions," Johnson said.

Source: http://news.brown.edu

Flowering at the right age

Perennial plants flower only when they have reached a certain age and been subjected to the cold. These two circumstances prevent the plant from starting to flower during winter. George Coupland and his fellow scientists from the Max Planck Institute for Plant Breeding Research in Cologne, Germany, have now discovered that the Alpine rock cress determines its age based on the quantity of a short ribonucleic acid. Perennial plants carefully balance periods of growth and flowering to ensure that they can live for many years. They do not flower when they are still too young and small or produce flowers on all their side shoots. Also, they do not flower out of season and they continue to grow after flowering. In temperate regions they do not produce flowers during winter but only after exposure to a long cold period. This dependency on a cold stimulus is called vernalisation.

Source: http://www.mpg.de

Signaling mechanism in plant cells

Plants possess receptors which are similar to the glutamate receptors in the brain of humans and animals. Biochemists at the Ruhr-Universität Bochum (RUB), Germany, with colleagues from the University of Würzburg, Germany, and the Agricultural University of China in Beijing have discovered that these receptors do not, however, recognize the amino acid glutamate, but many other different amino acids. The team has reported their finding in the journal *Science Signaling*.

It is a new kind of signaling mechanism in plant cells. To exchange information, cells send out signaling molecules that are recognized by receptors of other cells. Fifteen years ago, researchers discovered glutamate-like receptors, in short GLRs, in a plant. A team led by the RUB biochemists Prof. Dr. Michael Hollmann and Dr. Daniel Tapken has now identified the respective signaling molecules for one of the, in total, 20 GLRs from the thale cress (*Arabidopsis thaliana*). “Surprisingly, the receptor responds not only to one amino acid, but to many different ones — just not to glutamate”, says Hollmann. The most effective is methionine, an amino acid that humans have to obtain from food, but which plants can produce themselves. When the research team mutated the plant so that it no longer contained the receptor AtGLR1.4, it hardly responded to methionine.

For the analyses, the RUB team isolated the glutamate-like receptor from plant cells and implemented it in a cell that has no similar receptors — an unfertilised frog egg cell. “It is almost impossible to examine the receptor directly in the plant”, Hollmann explains. “There are so many processes operating at the same time that it is extremely difficult to filter out the critical signals.”

Source: http://aktuell.ruhr-uni-bochum.de

Improving crop yields in a world of extreme weather events

University of California, Riverside, the United States led team has developed new chemical for improving drought tolerance. A research team led by Sean Cutler, a plant cell biologist at the University of California, Riverside, United States, has found a new drought-protecting chemical that shows high potential for becoming a powerful tool for crop protection in the new world of extreme weather. Named “quinabactin” by the researchers, the chemical mimics a naturally occurring stress hormone in plants that helps the plants cope with drought conditions. Study results appear online this week in the *Proceedings of the National Academy of Sciences*.

Working on *Arabidopsis*, a model plant used widely in plant biology labs, Cutler and his colleagues focused their efforts on tinkering with one of the plant endogenous systems involved in drought responses. Plant leaves are lined with tiny pores, called stomata, which dynamically open and close to control the amount of water lost to the environment by evaporation. So that the plants can acquire carbon dioxide from the atmosphere, the pores need to be open some of the time, resulting in some loss of water.

The work is the first in a multistep process of bringing a new agricultural product to market. Given the complexity and costs of such a process, the UCR Office of Technology Commercialization (OTC) is working with an agricultural leader, Syngenta Biotechnology, Inc., the United States, to develop the technology.

Source: http://ucrtoday.ucr.edu

Biostatistics: New CD-ROM for self-learning

A new version of a self-learning CD-ROM on biostatistics is now available. The main objective of this self-learning programme is to understand the purpose of biostatistics through realistic cases and to acquire basic biostatistics skills that can be applied to your work. The target audiences of this training are medical and biomedical students, laboratory specialists and other professionals who need to use or understand basic biostatistics. For more information, contact:

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Bacteria in agrobiology: crop productivity

The future of agriculture greatly depends on our ability to enhance productivity without sacrificing long-term production potential. The application of microorganisms, such as the diverse bacterial species of plant growth promoting rhizobacteria (PGPR), represents an ecologically and economically sustainable strategy. The use of these bio-resources for the enhancement of crop productivity is gaining importance worldwide.

Bacteria in Agrobiology: Crop Productivity focus on the role of beneficial bacteria in crop growth, increased nutrient uptake and mobilization, and defense against phytopathogens. Diverse group of agricultural crops and medicinal plants are described as well as PGPR-mediated bioremediation leading to food security.

Emerging trends in cell and gene therapy

Examples from various organs and diseases illustrate the potential benefit obtained when both therapeutic approaches are combined with delivery strategies. Representing the combined effort of several leading international research and clinical experts, this book, Emerging Trends in Cell and Gene Therapy, provides a complete account on and brings into sharp focus current trends and state-of-the-art in important areas at the interface of cell- and gene-based therapies. This book addresses the current fragmented understanding regarding these two research areas and fills the vast unmet educational need and interest of both students and researchers in academia and industry.

For the above two publications, contact:

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