香港中文大學理學院
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理學院通訊 Newsletter

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Home, Sweet Home for Soybeans
Researchers Restoring Genomic Information of Soybeans

Prof. Samuel SUN Sai-man (left) and Prof. LAM Hon-ming will publish their latest findings on soybean genomic sequencing as the cover story of the journal *Nature Genetics*.

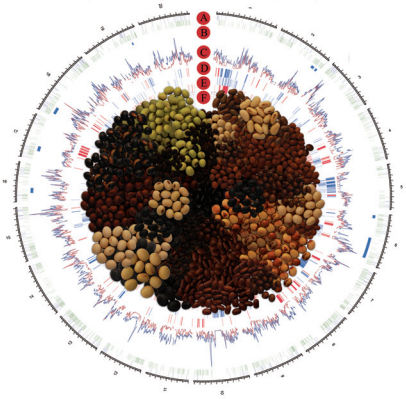
One of the earliest accounts of the cultivation of soybeans can be found in the Book of Songs, a 3,000-year-old collection of Chinese poems. Today, soybeans are grown all over the world. The soybean was introduced to North America by Samuel Bowen, a former seaman employed by the East India Company, in 1765. With an annual production of 80 million tons, the US is the world's largest soybean producer. China, the homeland of soybeans, on the other hand, cannot produce enough for domestic consumption and, in 2009, had to purchase close to US$10 billion worth of the crop from the US.

Prof. Samuel SUN Sai-man, director of the State Key Laboratory of Agrobiotechnology at CUHK, says, 'Soybeans from the US are good. But they're too pampered by fertilizers, herbicide and pesticide.' To toughen them up, the laboratory has launched 'Homecoming of Soybeans', a project aimed at restoring the genomic information of soybeans lost during the process of domestication, in order to improve their stress tolerance and to make them suitable for growing in more areas in China.

The project, a collaboration with the Beijing Genomics Institute–Shenzhen, has made major breakthroughs, including decoding the genomes of 17 wild and 14 cultivated soybean accessions and revealing their differences. Wild soybeans have higher genomic diversity than cultivated soybeans. **Prof. LAM Hon-ming**, deputy director of the laboratory, explains, 'That means wild species have more genetic resources that can facilitate their sustainable cultivation.'

Due to the depletion of good arable lands and fresh water resources in China, the effective utilization of marginal lands for cultivation has become a high-priority topic. Prof. Lam said, 'Northern China has many saline lands, and in the country's hinterland, coastal areas and north-western regions, arid lands abound. This makes the development of stress tolerant crops imperative. The soybean is also a nitrogen fixing crop that can absorb nitrogen from the air to fertilize soil at the rate of 100 kg per hectare per year, hence making it an environmentally friendly crop that can rehabilitate degraded lands.'

Genomic Differences Between Wild and Cultivated Soybeans
(Photo from Prof. Hon-Ming Lam)



Prof. Sun adds, 'China has 22%

of the world's population, but only 7% of its farmland. We're concerned about the issue of the country's food security in the future.' That is why the laboratory has devoted efforts to improving the yield, quality and stress tolerance of rice and soybean, two staple crops of the Chinese. The former provides carbohydrates, and the latter, protein and oil. The research team led by Prof. Lam has already identified anti-drought and anti-saline soybean lines and carried out field tests on them in arid regions in North-western China and on saline lands in Northern China. With the new genome sequencing data, he hopes that these soybean lines can be put to greater use.

The findings of the soybean genome sequencing has been published as the cover story in **Nature Genetics**, the top journal on genetics.

Small is Beautiful - Using the Fruit Fly to Understand Spinocerebellar Ataxia

Sometimes it's the small things that matter the most to us, such as being able to take a leisurely stroll after a long day at work, and playing football with your friends. But as **Prof. Edwin CHAN Ho-yin** of the School of Life Sciences would tell you, those living with spinocerebellar ataxia - a class of neurodegenerative disease - find that the everyday tasks they have been accustomed to, grow progressively difficult to accomplish. Inspired by those living with the disease, Prof. Chan has been trying to unravel the mystery behind spinocerebellar ataxia since 2003.

Researchers now know that many types of hereditary spinocerebellar ataxia are caused by an abnormal number of CAG repeats in disease genes, and that protein products in turn form lethal fibrillar aggregates inside neurons of the brain. However, scientists have yet identified possible solutions to prevent the disease from striking, or at least slow down the progress of damage to neurons in patients. Recently, Prof. Chan's research team achieved a significant breakthrough by identifying the HSPA1L gene as an effective agent in combatting against the accumulation of fibrillar aggregates. Using the *Drosophila* (fruit fly) as the model organism to study this disease, the team has shown that the manipulation of the HSPA1L gene level led to a decrease in the amount of abnormal disease protein. This latest finding could lead the way towards a treatment for the disease in the future, perhaps even result in curing these currently incurable illnesses. Starting from the fruit fly as a model to understand spinocerebellar ataxia, this small organism could be the key to making a world of difference not only for those suffering from the disease, but also those whose loved ones are struggling with this debilitating illness.

Prof. Edwin CHAN Ho-yin conducts research using *drosophila* (the fruit fly, LEFT) as models, hoping to find a treatment for spinocerebellar ataxia. Photo courtesy: Ming Pao (RIGHT)

Prof. Chan was awarded the Young Researcher Award 2009 - 2010 for his outstanding research achievements.

Biochemistry Students Win Gold Medal at MIT

Nine students from the Biochemistry Program, School of Life Sciences, won a gold medal award of the International Genetic Engineering Machines (iGEMs) competition held last weekend at the Massachusetts Institute of Technology, USA. This competition is an annual event of Synthetic Biology, and at its 8th year with 136 teams from universities around the world participated, only 60 teams were awarded gold medals. Under the supervision of **Prof. CHAN King-ming**, **Prof. CHAN Ting-fung** and **Prof. KONG Siu-kai** of the School of Life Sciences, the CUHK team significantly advanced the use of bacteria for information storage by strengthening its storage capacity and security system. This is the first time that The Chinese University joined the iGEM competition, with an innovative idea of BioCrytography, using bacterial plasmid DNA to store information of text, images, biological barcodes, etc. With this technology and its present standard, it is estimated that one gram of bacteria can store data up to 900,000 GB (Gigabytes) or 450 of 2 TB (Terabytes) hard drive of existing maximum capacity; it has great potential to other uses of data storage with encryption and decryption capabilities.

Developing bacteria in the laboratory.

A group photo of Prof. Joseph SUNG, CUHK Vice-Chancellor (4th left, back row), Prof. NG Cheuk-yiu , Dean of Science (5th left, back row), Prof. CHU Ka-hou, Acting Director, School of Life Sciences (3rd left, back row) and the award-winning team.

Prof. CHAN King-ming is very pleased with the students' result. "The team was formed early this year, and members have spent endless hours during the past 10 months developing the research project from scratch – from designing experiments, testing out the idea, to creating a website (http://2010.igem.org/Team:Hong_Kong-CUHK) and poster, and presenting in front of a panel of judges." The team was led by three instructors – **YU Chi-shing**, **LI Jing-woei** and **YIM Kay-yuen Aldrin**, and was composed of eight students – **LOO Fong-chuen Jacky**, **CHOI Ricky Thomson**, **CHU Tin-yi**, **WONG Kit-ying**, **CHIU Wai-yin Vivien**, **MAK Ka-yan Cathy**, **LIU Si-si Sophie** and **WONG In-chun Ada**.

Staff Honours

Prof. XIA Keqing, Chairman of the Department of Physics, was elected as a Fellow of the American Physical Society "for his tremendous contributions to our present experimental knowledge and understanding of turbulent Rayleigh-Benard convection" on 25 September 2010.

Hearty Congratulations!

State Key Laboratory of Agrobiotechnology Annual Meeting and Academic Conference 2010

Front from left: Prof. XD LI of CAU, Prof. LAM Hon-ming of CUHK, Prof. LI Ning of CAU, Pro-Vice-Chancellor Prof. WANG Tao of CAU, Prof. YIP Wing-kin of HKU and Associate Dean Prof. DW LI of CAU.

Approved by the Ministry of Science and Technology, the State Key Laboratory (SKL) of Agrobiotechnology (CUHK), was established in 2008 in partnership with China Agricultural University (CAU) in Beijing. The national-level laboratory was established with the mission of up-scaling China's agricultural technology to the world frontier to increase agricultural productivity, safeguard food security in China, and improve people's nutrition.

To facilitate deep collaboration between partner SKLs, annual conferences were hosted alternatively in Hong Kong and Beijing. The third annual conference this year was held in Shenzhen on Nov 11-12, 2010. A delegation of 32 professors and scientists from CAU led by the SKL Director Prof. LI Ning (Academician of the Chinese Academy of Engineering and Honorary Professor of the Faculty of Science, CUHK) and their Pro-Vice-Chancellor Prof. WANG Tao and a Chinese University of Hong Kong (CUHK) delegation of 12 professors and 42 researchers and graduate students led by the SKL Director **Prof. Samuel SUN Sai-man** attended the meeting.

In the meeting, the directors of both SKLs and ten other members reported the latest progresses, achievements as well as some important breakthroughs including two cover stories published in two consecutive issues of the Nature Genetics (the number one journal in the area of genetics with Impact Factor 34.284 similar to that of <Science> and <Nature>) by the teams of Prof. JS LAI of CAU and **Prof. LAM Hon-ming** of CUHK, for their important findings on Maize and Soybean Genomics Studies, respectively.

Through hours of in-depth discussion, the two SKLs also formulated development plans to actively promote cooperation between the mainland and Hong Kong partners on scientific advancement and strive to improve the well-being of tens of millions of the Chinese population.

After the meeting, the CAU Delegation visited CUHK on 13 November 2010.

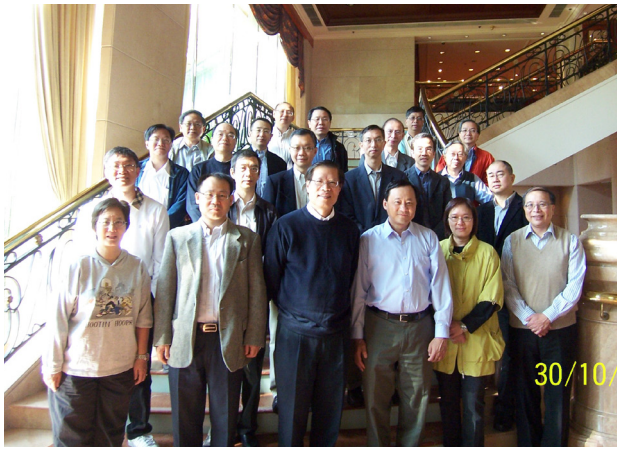
CUHK in Pictures 2009 - 10

An e-record of memorable moments of the CUHK in the past academic year is now available for viewing online:

http://www.cuhk.edu.hk/iso/cuhk-in-pictures/2009-10/en

Science Faculty Retreat 2010

The Science Faculty Retreat 2010 was held successfully on 30 - 31 October. The Dean Team gathered with representatives from the various programmes, departments and schools to discuss the future development of the Science Faculty. The Provost **Prof. Benjamin WAH** and Registrar **Mr. Eric NG** were invited to sit in the retreat to offer their insights and inspirations. It was hoped that with close communication among all units, our Faculty would be better positioned to overcome all future challenges while remaining true to our mission in educating and inspiring the next generation of scientific innovators and leaders, and expanding the frontier of human knowledge. Photo highlights are as follows:



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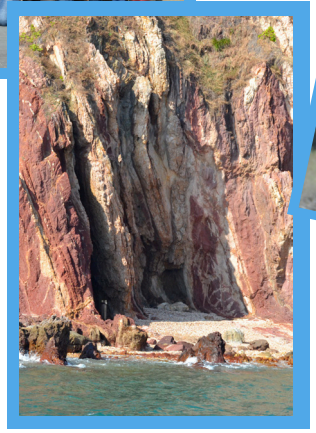
Staff and Students Explore Hong Kong's Geological Landscape

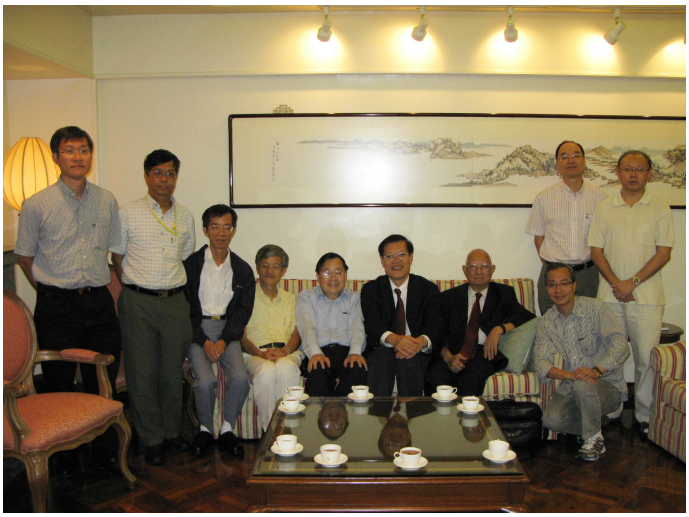
On 13 November 2010, 60 undergraduates and postgraduates, along with 21 staff and guests, went on a boat trip to visit the Hong Kong Geopark at Lai Chi Chong, Lai Chi Wo, and Yan Chau Tong Marine Park.



Retired Staff Homecoming

On 30 September 2010, our Faculty welcomed back four retired Physics faculty members at a retired staff homecoming.

Retired Prof. LEE Wing-kee, Prof. LAI Hon-ming, Prof. CHEN Fong-ching, and Prof. CHAN Yau-wa were welcomed back to the Science Faculty.



Members of the Dean Team (Front row: far left, 2nd left, 3rd right, far right; back row left) and Physics Department Chairman (back row right) were delighted to join the four retired professors at a friendly lunch gathering.

Upcoming Event:

The annual CUHK Alumni Homecoming will take place on Sunday, 19 December 2010. Alumni are encouraged to register for this event in advance at the offical website:

http://www.alumni.cuhk.edu.hk/homecoming/

Furthermore, please stay tuned to the Science Faculty's Homecoming webpage to keep abreast with the programme organized by our Faculty:

http://www.cuhk.edu.hk/sci/homecoming2010/

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