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NEWSLETTER

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IN THIS ISSUE

INTERNATIONAL COOPERATION

China-US Joint Liver Center

A ceremony was jointly staged by Zhejiang University School of Medicine No. 1 Hospital and the UCLA Medical Center on June 2, 2011 to undersign a cooperation accord, and put

a joint liver center into operation. This is the first time that the UCLA Medical Center selected a global partner. UCLA Vice Chancellor Eugene Washington sent his video congratulations to the ceremony, wishing the new center making its contribution to human health through a full range in-depth cooperation.

A liver transplant team, led by ZHENG Shusen, a CAE academician working for Zhejiang University School of Medicine No. 1 Hospital, has completed some 1,000 liver transplant surgeries, secured a benign end-stage 1 year survival rate of 95.2%, an internationally advanced record. The medical institution is currently the largest organ transplant center in the country. ZHENG said the two institutions will work on the medical techniques and tools for treating liver diseases, and basic pathology, through in-depth research and knowledge sharing. Personnel exchange is also part of the project.

Nanomaterials Convertible from Hard to Soft

Scientists from Chinese Academy of Sciences Institute of Metal Research, the Technical University of Hamburg, and the Helmholtz Center Geesthacht have developed a magic material that can change its strength, virtually at the touch of a button, from friable hard to elastic soft. The property can be changed by electrical signals. The finding was published in the recent issue of *Science*.

Researchers put precious metals such as gold or platinum into an acid solution for corrosion, allowing tiny ducts and pores being formed in the materials. Then, they poured nano-structured materials into the framework made up of minute ducts and pores, and instilled conductive liquid (such as salt solution or weak acid solution) into every tiny pores, making it a hybrid of metal and liquid.

Researchers called it the union of metal and water which, when triggered by an electric signal, enables the properties of the material to change at the touch of a button. The effect can be a strengthened or weakened atomic bonding in the surface of the metal when extra electrons are added to or withdrawn from the surface atoms. The strength of the material can be as much as doubled when required. Alternatively, the material can be switched to a state which is weaker, but more damage tolerant, energy-absorbing, and malleable.

Researchers said the novel material can switch back and forth from hard to soft. It generates electric signals either spontaneously or selectively, so as to strengthen the matter in the region having a local stress. Damages, for instance, in the form of cracks, could thereby be prevented or even healed.

Space Technology for Heritage Conservation

On June 2, 2011, CAS President BAI Chunli signed on behalf of the Chinese government an accord to establish an international space technology center for the conservation of natural and cultural heritage, the first of its kind established by UNESCO. UNESCO Director-General Irina Bokova had signed the accord on behalf of UNESCO on May 27, 2011.

UNESCO and other international organizations initiated in 2001 an open program to protect world natural and cultural heritages using space information technology. In the same year, the Chinese Academy of Sciences, the Chinese Ministry of Education, and the State Administration of Cultural Heritages jointly established a Laboratory of Remote Sensing Archaeology. The Lab became part of the open program in 2005. The Chinese Academy of Sciences submitted a proposal in May 2007 to UNESCO, asking to establish an international space technology center for the conservation of natural and cultural heritage in Beijing, which was supported by UNESCO. The proposal was endorsed in April 2008 by the 179th UNESCO Executive Board meeting, and was further confirmed in October 2009 by the 35th UNESCO General Assembly. The Chinese State Council formally approved the proposal on April 2011.

Taking advantage of the Earth observing capabilities and professional resources possessed by the Chinese Academy of Sciences Earth Observation and Digital Earth Center, the new center will provide a major technical support to UNESCO.

RESEARCH AND DEVELOPMENT

Possible Origins of Deadly E. Coli

According to the latest findings released by Beijing Genomics Institute (Shenzhen) on June 5, the pathogen that led to the deadly E. Coli outbreak in Europe was originated from the intestinal hemorrhagic Escherichia coli separated in Germany in 2001. Researchers found through a multiple-site sequencing that the strains have shown a high degree of similarity, compared with the 01-09591 strains separated in 2001 in Germany and the 55989 strains separated in 2002 in Central Africa. The three strains share seven completely identical "housekeeping genes" (the genes maintaining the cells essential functions), which made researchers conclude that the three colorectal bacteria belong to the same type (ST678).

Based on the discovery, researchers further tracked down the source of the outbreak. A

virulence/adaptation analysis of 12 E. Coli strains led to a new finding indicating that the strains causing the deadly E. coli outbreak this year are completely identical to the one separated in 2001 in Germany. Meanwhile, a comparison between the African strains and the two German strains indicated the missing of Shiga toxin gene and anti-subtellurite genes. Researchers believed that the strains separated in 2001 in Germany could probably be a direct ancestor of the strains causing the outbreak. Antibiotic resistance tests further showed that the decade long evolution has empowered the strains appeared in 2011 with some new genes that are more resistant to antibiotics.

Researchers said that strain genome comparison can further clarify the greatly enhanced pathogenicity of the epidemic strains, providing tips for the possible origin, transmission, and sources of the disease, allowing people to curb the global spread of the disease in a more effective manner.

First Goose Genome Map

Chinese scientists announced that they have completed the sequence of goose genome at a press conference jointly held on June 3, 2011 by Beijing Genomics Institute (Shenzhen), Zhejiang Academy of Agricultural Sciences, and Xiangshan Zhedong White Goose Research Institute. The goose genome map, the first of its kind in the world sequenced by Chinese scientists independently, is important for unveiling the genetic basis of domesticated goose' reproduction, stress resistance, growth, meat quality, and plumage color, and for understanding goose domestication and associated biological classification, the origin of domesticated Chinese goose, and goose breeding.

According to a briefing, with the help of the most advanced whole-genome shotgun sequencing solution, researchers established a database containing the sections of different insert length, sequenced goose genes from both ends, and patched them together using a computer program developed by the Institute. The whole-genome shotgun sequencing strategy, enjoying the merits of speedy/simple operation and low cost, has been widely applied to sequence plant and animal genomes, including rice, Panda, cucumber, oyster, tongue sole, grouper, red ibis among others.

The completed sequence of Zhedong White Goose genome will facilitate the genetic research of Zhedong white goose and associated commercial applications. At the same time, genomics based comparative study will provide direct scientific evidences for further unveiling the origin, geographic migration, and ecological evolution of domesticated Chinese goose, and lay the ground work for understanding the molecular sequence of genome, gene-level goose species improvement, raising the quality of goose meat, and creating better feeding conditions.

Rapid EHEC Detection

Chinese scientists have developed a technique able to detect and identify EHEC O104H4 in a quick manner. The technique has been diffused for nationwide application. XU Jianguo, China CDC Infectious Diseases Prevention and Control Institute Director, said there are three known common EHEC serotypes: O157, O26, O111, and more than 40 uncommon ones. The one that caused the recent outbreak in Germany, or O104H4, is a rare serotype in the EHEC family, having Shiga toxin 2 (vtx2a) gene and three intestinal adhesion genes (aatA, aggR, aap).

Before this, China CDC Infectious Diseases Prevention and Control Institute had established an EHEC-O157H7 detection and identification system, and developed the E. Coli virulence plasmid detection technique. The quick detecting technique developed this time is tailored to screen 4 EHEC genes (Shiga toxin 1,2, hemolysin, and EAE pathogenicity island), 3 intestinal adhesion E. Coli virulence plasmid aatA, aggR, and aap, and O104 and H4 genes. A Nankai University TEDA Biotechnology School team led by Prof. WANG Lei, in collaboration with China CDC, has established a diagnosis database containing some 50 EHEC sera, and more than 10 E. Coli H (flagellar) antigen sera, including O104 and H4. Meanwhile, researchers have developed a PCR method able to detect O104H4, along with the needed diagnostic sera.

It is reported that the technique developed by the two teams of scientists is not only able to detect EHEC-O104H4, but is also able to detect other EHEC serotypes.

NEWS BRIEFS

EMU with Highest Body Strength

The first electric multiple unit (EMU) developed by China for Rio de Janeiro rolled off the assembly line on June 7, 2011 at the CNR. It is the first time for a Chinese made EMU, enjoying the highest level of body strength in the world, made its debut in a South American market.

The multiple unit train is a Model A stainless vehicle, made up of four carriages, designed with a top speed up to 100km/h. The unit is built on a broad gauge bogie (1600mm), assisted by an advanced AC drive system for enhanced traction and braking capability. The

auxiliary power system is scalable for an expanded power supply capacity. The train is controlled by a real-time display system, with a sophisticated passenger information system and emergency passenger exits. Designed with a strict fire safety system up to the German and the United States standards, the train will serve for the World Cup in 2014 and the Summer Olympics in 2016 in Rio de Janeiro.

Second Rainbow Bay Imaging

China’s lunar satellite Chang'e II has recently completed the second mission to image the Rainbow Bay on the moon, including descending over the Rainbow Bay area, imaging the bay area, and ascending back to orbit. The lunar satellite departed the moon orbit on June 9, 2011, heading for the “Lagrange point 2", a gravitational balance point between the Earth and the Sun, for more space explorations, getting prepared for China’s Mars probe in the future.

According to China Academy of Space Technology designers, researchers are supposed to tap up the remaining resources and capabilities of Chang'e II for further orbital experiments, once it reaches the end of working life, including technical tests for Chang'e III soft-landing. Meanwhile, Chang'e II was guided to image the Rainbow Bay area for the second time, in an attempt to dig up more detailed data for Chang’e III’s landing mission.

Chang'e II is currently working smoothly under a stable attitude. The satellite will work on the long-term deep space operation of X-band transponder, and the long-term tests of lunar UV sensor, along with other probe missions.

Enhanced Data Application Environment

Not long ago, a data application environment capacity building and service project undertaken by the Chinese Academy of Sciences passed an acceptance check. Launched in the 11th Five-year period (2006-2010), the project has completed the construction of a data resource center with a data storage capacity of 6.42PB at the end of 2010. The data center is also connected to other CAS databases, enjoying a shared data volume up to 148TB. Compared with the 10th Five-year period (2001-2005), the resources possessed by the scientific database went up by 8.9 times, and a storage capacity raised by 92 times.

As of the end of 2010, the scientific database has consolidated 148TB of shared data, and established 538 themed databases, covering chemistry, materials, space, astronomy, remote sensing, man-land system, animals, microorganisms, fusion, Qinghai Lake, frozen earth, ecological function zoning, compounds, plant species, soil, marine, geochemistry

among others.

The project has provided storage services to some 30 users who are part of large science projects or major scientific facilities, with a volume exceeding 700TB, enjoying a storage facility utilization rate of 80.5%.

According to incomplete statistics, during the 11th Five-year period, the Data Environment has registered an averaged annual visit of 7.07 million hits, and a download volume up to 101.8TB, or 4.6 times and 90 times up respectively, compared with the 10th Five-year period.

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