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SPECIAL ISSUES

China Builds up Biological Strength

China will build up its bioeconomy in three phases, striving to be a nation possessing internationally advanced biotechnologies and biobusinesses in a period of 15 years, said WAN Gang, Chinese Minister of Science and Technology at an international conference on bioeconomy held on June 26, 2007 in Tianjin. The three-phase strategies will be implemented in line with following steps: the first step is to work on a technical preparation phase till 2010, during which China's shall be a leader among developing countries in terms of its overall biotechnological R&D level, with its biotech papers and patents being among the world's top 6 in number, and a biotech output reaching RMB 800 billion, of which the output of modern bioindustry comes at RMB 200 billion or more. Phase II, running through 2015, will see the mushrooming of bioindustry, with an internationally advanced level, and a 3rd or 4th place for the number of papers and patents, enjoying a biotech output worth RMB 1.5 trillion, of which MB 800 billion comes from modern bioindustry. The final phase, scheduled to end up in 2020, will allow China to develop its bioindustry in a sustained manner. China will become a country with internationally advanced biotech R&D and industry, a major innovative center gathering top notch talents in the area, enjoying a biotech output of RMB 2.5-3 trillion, making the industry a pillar of the national economy possible.

XU Guanhua, former Chinese Minister of Science and Technology, told audiences that to address major bottleneck issues that hold back China to have a coordinated and sustainable economic and social development, including population growth, food shortage, environmental pollution, and energy crises, China will launch ten major actions to spur up bioeconomy.

- 1) Life science action. Accelerate cutting-edge innovations in the area of life sciences, striving for all-round breakthroughs in genomics, proteomics, stem cell, system biology, and brain/cognitive sciences;
- 2) Biopharmacy action. Enhance the role of bioproducts, such as vaccines, in preventing, treating, and even eradicating major infectious diseases, raising the weight of biomedicines, and gradually shaping up a tripartite pattern made up of chemicals, bios, and naturals;
- 3) Bioagriculture action. Speed up innovations of genetic modification, molecular breeding, and cloning techniques for agricultural activities, upgrading animal and plant species, working out new animal and plant varieties possessing super properties, and protecting food security;
- 4) Bio-manufacturing action. Enhance innovations of bioindustry, in an attempt to reduce pollutant emissions and cost of production, promote environment friendly manufacturing, and speed up upgrading of traditional industries;
- 5) Bioenergy action. Ease the pressure of energy shortage, and develop biomass energy, including pollution free and renewable fuel ethanol, and bio-diesel, in an effort to raise the technical level of China's bioenergy industry, and stage industrial demonstrations for such products;

- 6) Bioenvironmental protection action. Speed up innovations in the area of bioenvironmental protection, raising China's capability of handling waste gas, water, and residues, improving saline and alkaline soils, and restoring vulnerable ecological environment;
- 7) Bioresources action. Enhance the development and utilization of special bioresources, and create novel bioindustries;
- 8) Biosecurity action. Protect national biosecurity, and enhance innovations of biosecurity techniques, through establishing proper biosecurity systems for labs, genetic modification, food, and through raising the capability of biosecurity protection and fighting against bioterrorism;
- 9) Bioindustry action. Spur up the conversion of biotech findings and upgrading of major products, foster biotech businesses that enjoy strong innovation capacity and international competitiveness, and establish incubators and commercial application platforms for bioindustry;
- 10) International biotech cooperation action. Facilitate the import and utilization of talented people, technologies, and products in the area of biotechnology, guiding and facilitating international collaborations with industry as a key player, initiating key international cooperation projects, establishing joint research institutes, creating world class biotech platforms, and enhancing the comprehensive utilization of international S&T resources.

#### Innovation Environment for Biopharmacy

Four government agencies, including Ministry of Science and Technology, Ministry of Commerce, Ministry of Health, and State Food and Drug Administration, and Tianjin Municipal Government, have inked an accord on June 26, 2007 in the Binhai New Area, to jointly construct an international innovation park for biopharmacy. DAI Xianglong, Mayor of Tianjin, and XU Guanhua, former Chinese Minister of Science and Technology, unveiled the construction model of the project.

LIU Yanhua, Chinese Vice-Minister of Science and Technology, told reporters that the four government agencies and Tianjin government will work together to attract high caliber personnel to be part of the park, in 5 to 10 years. The park is designed to develop proprietary pharmaceutical products, along with establishing pharmaceutical businesses and research institutes, in an attempt to build the park into a domestic leader renowned for its biopharmaceutical development integrated with R&D, industrial incubation, production, and trade. It will also serve as open international platform for biopharmacy, and a pilot project to raise the proprietary innovation capability utilizing international resources. It is expected to become a pillar industry in the economic development of Tianjin.

#### INTERNATIONAL COOPERATION

##### Specific Immune Responses to Influenza Vaccine in Utero Confirmed

Thanks to their many-year study, Chinese and US scientists have for the first time confirmed the antigen-specific immune responses to influenza vaccine in utero. The finding, derived from the joint study of WANG Chaodong, a research fellow at Jiangxi Provincial People's Hospital, Nanchang, China, and Rachel L. Miller, Department of Medicine, Columbia University College of Physicians and Surgeons, New York, USA, was published in a recent issue of *Journal of Clinical Investigation*, under the title "antigen-specific immune responses to influenza vaccine in uter", confirming the fact that human body is able to produce an autoimmune response to antigens, allergens, and pathogens even before birth. The process also leads to an immunity memory.

According to WANG, the conclusion was derived from a study made to 126 European and American pregnant women. He and his collaborators found that embryos could acquire an immunity through their mothers who were vaccinated with the influenza vaccine in the 28th-30th weeks of pregnancy. The finding is believed to be important to the public health domain, as it may eventually change the rule that pregnant women are not encouraged to be vaccinated during their pregnancy.

Both journals *Nature* and *Science* have reported the finding in their website. Experts made commentaries that environmental factors that mothers are exposed to will shape up the immune system of their unborn children, affecting their immune responses after birth and throughout their adulthood. The theory has created a brand new approach for studying the pathogenesis of immune diseases, including allergy, asthma, autoimmune diseases, and cancers. It also opens up a new research direction for vaccination before birth, which may eventually cut off the spread of common infectious diseases, such as hepatitis A, B, and influenza.

##### Traditional Medicine for Internationalization

A China-Europe conference on traditional Chinese medicine dropped its curtain on June 28, 2007. Participants discussed a range of issues concerning the internationalization of traditional Chinese medicine, and reached consensus on defining priorities for such collaborations. Participants believed that the combination of traditional Chinese medicine with modern life sciences, biotechnology, and Western medicine, would result in a new approach for fighting human diseases. Medical and industrial communities in both China and Europe shall work together to spur up innovations of traditional Chinese medicine. SHANG Yong, Chinese Vice-Minister of Science and Technology, and Serafino Zucchelli, Italian Vice-Minister of Health made their speeches at the closing ceremony.

The meeting has agreed on future collaborations between China and Europe in the following five major areas: 1) study scientific principles and mechanisms of traditional Chinese medicine, with priorities on mental diseases, cardiocerebrovascular diseases, tumors, and AIDS disease, through clinical TCM treatment, prevention, and recuperation; 2) study pharmaceutical theories of traditional Chinese medicine, especially on developing innovative drugs; 3) develop internationally accepted standards, criteria, and policies for traditional Chinese medicine; and 4) strive to achieve substantive progresses in fostering bilateral and multilateral collaborations, including facilitating the collaborations between universities, research institutes, hospitals, and industries, establishing joint clinical research centers, joint labs, or joint clinics, through bilateral or multilateral arrangements; 5) promote international exchanges and diffusions of traditional Chinese medicine and associated cultures, including the consolidation and diffusions of ancient TCM literatures and journals.

As an important step to promote cooperation, the Chinese Ministry of Science and Technology will stage an international conference on traditional Chinese medicine at the end of November 2007, where an international TCM cooperation program will be initiated under co-sponsorship of a number of other countries. The conference also expects other outcomes, including a Beijing declaration on international TCM cooperation, an international council and an expert panel for such collaborations, and an online international TCM research institute.

#### China-Germany Improve Lake Water Quality

Anhui Institute of Environmental Science started in 2005 to work on the eutrophication of Chaohu Lake, in collaboration with TU Braunschweig. As an initiative supported by the intergovernmental S&T cooperation program between China and Germany, the project is designed to fence off the adverse effects of algae on the water body of Chaohu Lake, and improve the water quality of the lake, in an attempt to protect drinking water safety of both Hefei and Chaohu, using the experience German scientists have learnt in removing algae toxicants. Consisting of 4 sub-projects for water management modeling, aquatic plant based purification experiment, environment oriented economic evaluation, and decision making system for the basin, the project has established a nutrients import and control model for the entire basin, and made an in-depth analysis of the causes of eutrophication, and the impacts of algae toxicants on drinking water, through studying the contaminations, economic development, and natural environment across the basin. The finding creates a ground for establishing a comprehensive management and decision making system for the purpose.

Sub-projects have so far proceeded smoothly, with a range of missions completed, including collecting basic data, lake modeling, water quality modeling, basin modeling, and installing three multifunctional automatic water quality monitoring stations. Researchers also worked on the purification of algae toxins in water and sediments, using aquatic plants and biomembranes. The project has rolled out effective means for monitoring contamination events over the lake area in a real-time manner, providing reliable technical support and evidences for improving the quality of water resources of Chaohu Lake.

### RESEARCH AND DEVELOPMENT

#### Bird Flu Antibody Immune to Viral Mutations

Scientists from Xiamen University, University of Hong Kong, and Yangshengtang Co. Ltd., have for the first time found a bird flu antibody that is highly conservative and neutral, and is able to fight bird flu viruses, regardless of their mutations. The development marks an important progress achieved by Chinese scientists in bird flu prevention and control.

According to a briefing, the finding has for the first time revealed an antibody that can neutralize infections caused by mutated bird flu viruses. The study also shows that the monoclonal antibody is able to save the death caused by mutated bird flu viruses. It is of an application value for producing more desirable therapeutic effects on different mutations, compared with the prevailing drugs currently used for the purpose. It is, therefore, a desirable candidate for long term preparedness for the disease. Researchers are now applying for clinical trials for the antibody.

The effort has also resulted in an H5-specific monoclonal antibody database, the largest of its kind in the country, containing 480 monoclonal antibodies that can be used to monitor the mutations of bird flu viruses.

#### Satellite Watches Wetlands

Researchers of Institute of Remote Sensing Applications, part of the Chinese Academy of Sciences, have started to collect biomass data from Fanyanghu wetlands, in a move to prepare for the satellite watch in the near future. So far scientists have collected specimens from some 120 biological spots across the wetlands. Monitoring Fanyanghu wetlands using satellite is a research topic under the National 863 Program for the 11th Five-Year period (2006-2010), designed to enhance China's dynamic capability of monitoring the biomass of ground vegetations, using satellite based radars. The effort will also provide technical means for Jiangxi Province measuring the biomass of its vegetations, and evidences for protecting the Lake's ecosystem.

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