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NEWSLETTER

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IN THIS ISSUE

SPECIAL ISSUES

China s S&T Accomplishments in Last 6 Decades

In the last six decade since the founding of the People s Republic of China, China has turned itself into a science and technology power, witnessed a profound historical change and rendered a powerful support to the economic development, social advancement, the improvement of people s life, and national security.

1) Thanks to the development over six decades, China has become one of few countries in the world possessing a well-functioned S&T system covering a wide range of disciplines.

National research institutes, universities, local research institutes, and industry have become the major players in the S&T development. China has registered a large increase of S&T expenditures, enjoying increasingly improved research conditions and S&T infrastructures, with a steadily increased government S&T appropriation from RMB 56 million in the 1950s to RMB 254 billion in 2008. In 2008, China spent RMB 457 billion on R&D activities, or 1.52% as a proportion of GDP. Thanks to the development of six decades, China has become a country possessing 42 million S&T personnel, and a high caliber R&D contingent of 1.9 million person/year.

2) Since the founding of the People's Republic of China, Chinese scientists have achieved a wide range of internationally advanced findings in the frontiers of science, including theory of analytic functions of several variables, Goldbach conjecture, anti-sigma minus hyperon particles, theory of oil generation from continental moist depression, synthetic crystalline bovine insulin among many others. Since the adoption of reform and opening up policy, China has harvested numerous innovative findings that have an international influence in the area of high-temperature superconductor (HTSC), nanomaterials, quantum communication, paleontological archaeology, and life sciences, with major breakthroughs landed in super hybrid rice, high performance computer, super large scale integrated circuits, and 3G mobile telecommunication. In 2008, Chinese papers collected by SCI sat in third place in number, with invention grants in fourth. China has become an S&T leader in the developing countries, with some of its research fields reaching an internationally advanced level.

3) After the founding of the People's Republic of China, the Chinese government made a decision to develop two bombs (atomic bomb and hydrogen bomb) and satellites. Chinese scientists have achieved desired results under extremely difficult conditions. The implementation of manned space flight and moon probe projects has made China one of few countries in the world possessing advanced space technologies. Chinese engineers have built the Three Gorges Dam and Qinghai-Tibet Railway through working hard to address a range of technological difficulties. S&T development also rendered a powerful support to the success of the Beijing Olympics and Paralympics in 2008. Not long ago, the Chinese government has secured 16 S&T earmark projects involving national economy, social development, and national security, in a move to grasp the initiatives of S&T and economic development, and foster up new strategic industries.

4) In the last six decades, Chinese scientists and engineers have rolled out an array of industrial equipment and novel materials that needed by the national economic development, and discovered/developed numerous large oil fields and mines, which made China an oil rich rather than poor country. Since the adoption of reform and opening up policy, China's S&T development has been defined to serve the major battleground of economic development. Chinese S&T personnel developed and applied a string of key and

generic technologies, based on the imported advanced technologies, noticeably enhanced China's engineering capability of developing proprietary technologies and equipment. China's basic, processing, and manufacturing industries enjoy a further enhanced technology innovation capability, with the booming development of emerging industries, including electronics and information, biopharmaceutical, new energy, and advanced manufacturing. Additionally, the increasingly expanded scale of high tech industry and the fast development of high tech businesses, along with the congregation, radiation, and mobilization role played by national high tech parks, has made China's high tech industry a promising industry with huge perspectives.

5) The last six decades has witnessed the booming development of S&T activities in agriculture, produced more than 8,000 new crop varieties. The extensive diffusion and application of new hybrid rice varieties and the implementation of agricultural projects represented by "Food Harvest", 95% of the croplands has been covered by improved varieties. The greatly enhanced food production capacity has made China able to feed 22% of the world's population with less than 10% of the farmland in the world. The spin-off and application of an array of agricultural S&T findings, the establishment of a multiple component rural S&T service system, and training of more than a million rural technicians has facilitated the transition from the traditional agriculture to the modern one, desirable for the construction of socialist new rural areas and the coordinated development of both urban and rural areas. China has also made breakthroughs in a range of key technologies concerning population, health, resources, environment, public security, and disaster prevention/preparedness, resulted in an enhanced S&T support to dealing with emergency events and major natural disasters. The strengthened science outreach activities, and diffusion of scientific knowledge, has raised people's scientific literacy, rendering a spiritual and knowledge support for building a socialist harmonious society.

6) The increasingly deepened reform has resulted in a substantively changed S&T system, with an optimized distribution of disciplines, a closer tie between the S&T development and the economic development, and increasingly improved S&T management and operation. China has landed laudable breakthroughs in knowledge innovation, technology innovation, and regional innovation, and in the establishment of a technology innovation system made up of a combined force of industry, universities, and research institutes with industry as the major player and the marketplace the orientation. Meanwhile, China has picked up the speed to improve the legal environment for S&T activities, with more legislations available for protecting S&T activities, including the laws on patent, S&T advancement, S&T findings spin-off, and popular science. It also published a strategic outline for developing China's intellectual property, along with an array of policies and measures encouraging proprietary innovations. The deepened international S&T cooperation has linked China to 152 countries or regions, allowing Chinese scientists to work with their international counterparts in diverse forms, in expanded fields, and at a higher level, desirable for proprietary

innovations and expanded opening.

51% S&T Contribution to Agriculture

SUN Zhengcai, Chinese Minister of Agriculture said on October 20, 2009 that S&T advancement has become a decisive force that spurs up both agricultural development and economic development in the rural areas, with a greatly raised S&T contribution from 19.9% in the first Five-year Plan period (1953-1957) to current 51%.

At a meeting held to encourage S&T innovation activities in the area of agriculture and associated diffusion, SUN said the application of improved crop varieties has noticeably enhanced China's food production capacity and agricultural products supply. According to incomplete figures, Chinese scientists have bred out more than 10,000 new crop varieties or combinations, and realized large scale varieties upgrades for 5 -6 times, which raised the coverage of improved varieties from 0.06% in 1949 to current 95% or above, with an increased per mu (1 mu= 0.0667 hectare) yield from 69 kg in 1949 to current 330kg, and a total food output from 115 billion kg to current 528.5 billion kg.

SUN added that the development and diffusion of advanced proven farming techniques and technologies has greatly raised the efficiency and output of farming activities. Local farmers have readjusted the cultivation systems, focusing on the system that yields high quality and high yield products, which facilitated technology advancement, innovation, and diffusion of advanced proven farming techniques, and raised S&T levels and output of farming activities. The fast development of agricultural techniques and technologies has helped to break up the regional and seasonal limits of farming activities, allowing an affluent food and vegetables supply.

Meanwhile, the steadily improved pest and diseases prevention and control technologies has greatly enhanced the response to biological disasters. Chinese scientists have mapped out the epidemic patterns and migration routes of major diseases and pests, and developed sustained prevention and control technologies, ensured a safe crop production and effectively reduced the losses caused by diseases and pests. The successful development and diffusion of animal vaccines has led to a sustained and effective control of major animal epidemics, and a noticeably reduced animal mortality.

Additionally, the breakthroughs in biotechnology, including the development of genetically modified new species, has led to the establishment of space based breeding technology and associated system, greatly raised China's proprietary innovation capability in agriculture. The import of new industrial techniques, animal disease prevention techniques, and sustainable development technologies, has laid a solid ground for establishing an innovative industrial technical system, and for enhancing industrial

competitiveness.

INTERNATIONAL COOPERATION

MOST and California Jointly Work on Stem Cells

WAN Gang, Chinese Minister of Science and Technology and his party visited on October 18, 2009 California Stem Cell Institute for Regenerative Medicine, where JIN Xiaoming, Director of MOST Department of International Cooperation, and Alan Trounson, President of California Stem Cell Institute for Regenerative Medicine signed a Memorandum of Understanding to jointly study stem cells. According to the MOU, both parties will fund the joint research.

Silkworm Genome for Application

An international workshop, co-sponsored by the Chinese Ministry of Science and Technology and Chongqing Municipal Government, was held October 22-23, 2009 in Chongqing, to discuss the functional genomics of domesticated silkworm and the socalled modern Silk Road, in an attempt to strengthen international exchanges in the area. Entomologists from 21 countries, including the United States, Japan, Greece, France, the UK, Australia, and India, expressed their willingness for an in-depth cooperation with Chinese scientists in the area.

According to XIANG Zhonghuai, chair of China Silkworm Genome Project and an

academician of the Chinese Academy of Engineering, transforming traditional silk industry with modern technology is a new goal of the modern Silk Road, in which medical instruments, immune medicines, and silk products will be the major R&D targets. Taking into account the fact that silk goes well with human tissues, researchers are working with the help of genetic modification techniques to produce the artificial skins and blood vessels made of silk, so as to effectively ease the repulsion reaction, and give the artificial skins and blood vessels a smoother and better look.

XIANG explains that the silk producing gland in domesticated silkworms works like a highly efficient protein factory. Researchers are now studying the elements in silk protein that can be used for medical purposes. Additionally, one can turn the effective immune components in silkworm genes into immune medicines to improve people's health and extend one's life. As a typical Lepidoptera insect, domesticated silkworm can also be used to treat pests, as half of the pests attacking crops and trees are Lepidoptera insects. Researchers are trying to find a pollution free approach to treat Lepidoptera pests, through improving their understanding of silkworms in the context of physiology, pathology, development, and genetics.

RESEARCH AND DEVELOPMENT

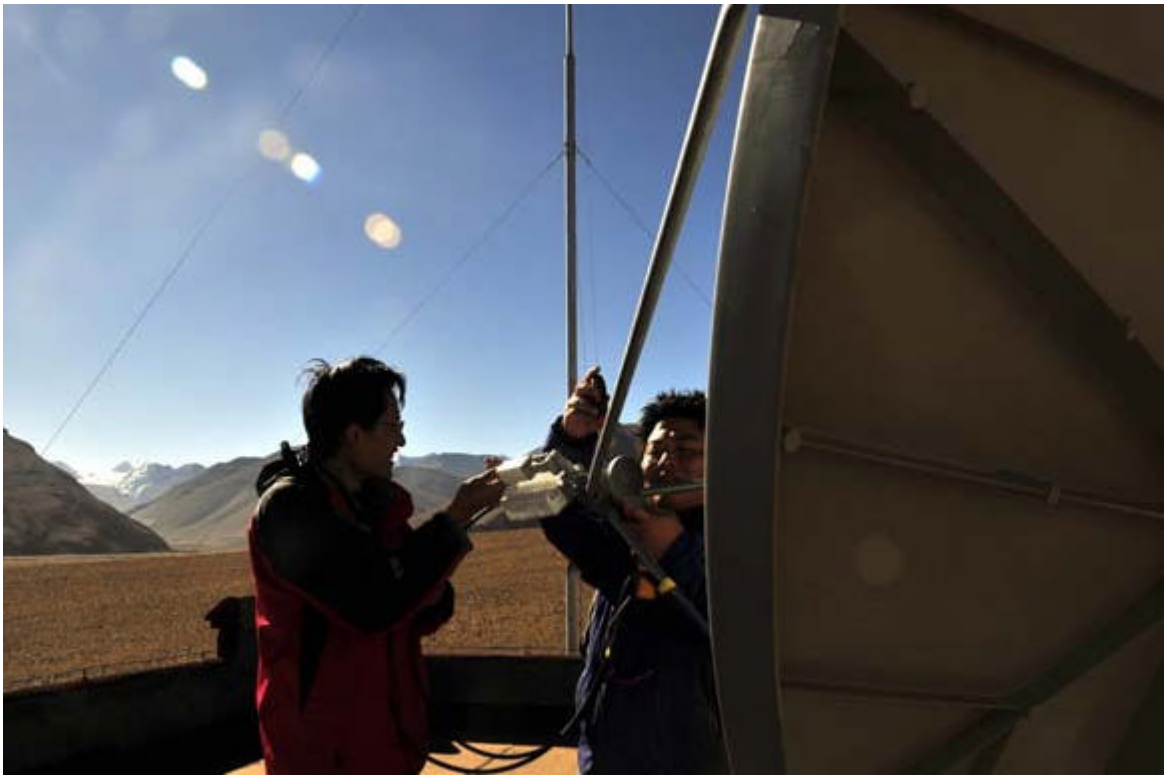
New Pathogenesis Mechanism Found with Multiple Sclerosis

A study, led by PEI Gang at Molecular Cell Biology Laboratory under CAS Shanghai Institutes for Biological Sciences, has found that MicroRNA miR-326 regulates TH-17 differentiation and is associated with the pathogenesis of multiple sclerosis. In recent years, immunologists found that the massive induction of CD4+T cells and associated attacks to the diseased part in human body may increase tissue damages. The rat model based multiple sclerosis study has confirmed that the increased RNA (miR-326) level would make rats 'sclerosis worse, while inhibiting RNA (miR-326) level to a controlled level may noticeably ease the development of sclerosis. The finding, published in the online October 19 issue of *Nature-Immunology*, was funded by Chinese Ministry of Science and Technology, National Natural Science Foundation, Shanghai Municipal S&T Committee, and Chinese Academy of Sciences. Researchers have also filed a patent application for the finding.

NEWS BRIEF

Unmanned Seismological Observation on Peaks

Unmanned earthquake observing station at the foot of Mount Everest.



Tuning observing equipment.

Reading data.

China has recently installed an unmanned earthquake observing station at the foot of Mount Everest, the highest peak in the world. Physically located in Zhaxizong village, Dingri County, Rikaze Prefecture of Tibet, the station, equipped with seismometer, data collector, solar power generator, satellite transmission equipment, and GPS observing equipment, sits in a Tibetan house at an elevation of 4255m, some 40km from the main Headquarters of the Mount Everest. The station was set up to collect the needed seismological data in the most inaccessible area of the country.

According to a briefing, the seismometer collects seismic wave signals, and turns them into digital data through the data collector, before sending them in a real-time manner to the Tibetan Seismological Bureau Monitoring Center in Lhasa, the capital of Tibet Autonomous Region, and China Earthquake Administration in Beijing. Several days 'test run shows that the station is able to work in a tough environment. The advanced solar power generator at the station can maintain a smooth operation even without sunshine for 5 consecutive days.

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