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Premier C. Chen promised to leave no stone unturned in implementing the four-year science and technology blueprint (2013-2016) proposed by the National Science Council. It contains seven goals: upgrading academic research, protecting intellectual property rights, promoting sustainable development, strengthening research and industry cooperation, encouraging integrated science projects, boosting scientific and technology innovation, and tackling sector brain drain.

The Tang Awards, created by Ruentex Group Chairman Samuel Yin, are to become known as the Asian equivalent of the Nobel Prize, aiming to raise Taiwan's profile in the international academic community. With the help of Academia Sinica, Taiwan's top research institution, it will honor individuals, regardless of nationality, who have made outstanding contributions or who have achieved significant breakthroughs in sustainable engineering, medical and biotech research, Sinology studies, and law. A cash prize of NT\$ 50 mio. will be presented to the winner in each of the four categories. The Tang Awards are to be presented every two years.

News Highlights:

Neurosurgery professor Lin Shinn-zong of China Medical University in Taichung City has been named a Charter Fellow of US-based National Academy of Inventors – National Cheng Kung University developed a digital painting pen that allows users to change brush strokes and colors with a single pen when drawing on a computer screen – cognitive neuroscientists found cross-cultural universality of brain networks for recognizing word shapes and handwriting gestures during reading – National Cheng Kung University developed an optical system to quantify the properties of biological tissues noninvasively – Taiwan is adjusting the focus of climate change research (a new study on how agriculture and ecology are influenced by climate change) – Academia Sinica researchers develop a new approach of using a “molecular dam” to enhance the mass transport of protein molecule enrichment, which could help accelerate the detection of disease in the preliminary stages – National Taiwan Normal University and Pennsylvania State University establish an international research center to promote Chinese language learning – Three Taiwan think tanks rank among Asia's top 40 research institutes – Kaoshiung Chang Gung Memorial Hospital is to conduct experimental hand transplants – a research team from the National Chung Hsing University produced the world's first cloned miniature pigs – scientists at the Genomic Research Center developed potential carbohydrate-based vaccines against breast cancer.

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1. Taiwan neurosurgeon named to US inventors academy

(Taiwan Today, 02 01 2013)

Neurosurgery professor Lin Shinn-zong of China Medical University in Taichung City has been named a Charter Fellow of U.S.-based National Academy of Inventors. Lin, who doubles as superintendent of CMU Beigang Hospital, is the first scholar in Taiwan to obtain such an honor, the university said Jan. 2. In 2010 he received the Bernard Sanberg Memorial Award for Brain Repair from the American Society for Neural Therapy and Repair, CMU added. The NAI recognized Lin for his more than 20 international patents, long-term dedication to the development of drugs for malignant brain tumors and invention of a brain positioning system for brain surgeries, CMU said. His most valued accomplishment is the successful transplant of embryonic cells to a patient with Parkinson's disease, the university stressed. "This is an encouragement and a responsibility," Lin said, adding that although he faces challenges and frustrations in the development of new drugs, he is happy to help patients alleviate their pain by way of transforming academic innovation into clinical treatment. The NAI selection committee elected 98 innovators worldwide, including eight Nobel Prize winners, the academy said, adding that those named "have demonstrated a highly prolific spirit of innovation in creating or facilitating outstanding inventions that have made a tangible impact on quality of life, economic development, and the welfare of society." The awards ceremony will be held Feb. 22 in Tampa, Florida.

<http://www.taiwantoday.tw/ct.asp?xItem=200334&ctNode=445>

2. University develops digital painting pen

(Central News Agency, 06 1 2013)

A local university has developed a digital painting pen that allows users to change brush strokes and colors with a single pen when drawing on a computer screen. Users can change the pen's paint color, brush thickness, and brush type, such as watercolor and crayon, by rotating or pressing the pen or by changing the angle at which the pen is held, the National Cheng Kung University said recently. The pen, which can be used on tablet computers, is convenient because users do not have to change paint functions on the computer screen, said Wu Fong-gong, an industrial-design professor at National Cheng Kung University, who led the research team. He said the pen may also make drawing more enjoyable for young children since it offers multiple types of pen strokes. The team has received a patent for the pen in China and is currently applying for one in Taiwan, according to the university.

http://focustaiwan.tw/ShowNews/WebNews_Detail.aspx?Type=aSOC&ID=201301060007

3. Cognitive Neuroscientists Find the Cross-cultural Universality of Brain Networks for Reading

(MEPO Forum, 07 01 2013)

The research team of cognitive neuroscientists jointly led by Academician Dr. Ovid J. L. Tzeng in Academia Sinica and Dr. Stanislas Dehaene (correspondence author) in INSERM, France has found cross-cultural universality of brain networks for recognizing word shapes and handwriting gestures during reading. The findings shed light on the neurobiological circuitry for reading, confirming the "one brain for all written language" view proposed by Academician Tzeng and suggest a neuronal recycling mechanism in the human brain. The research was published in the *Proceedings of National Academy of Sciences of the United States of America (PNAS)* on December 11, 2012. The mature cerebral reading networks were identified to comprise both a visual shape analysis system (i.e., occipitotemporal visual word form area) and a motor gesture decoding system (i.e., Exner's area). However, reading of logographic writing system such as Chinese has been proposed to rely on brain areas outside the classical left-hemisphere cerebral networks for alphabetic reading. Such cultural variations may reflect a neuronal recycling mechanism that novel cultural acquisitions (e.g., writing and arithmetic) encroach on preexisting and innate neural circuits. In this cross-cultural neuroimaging study, researchers used functional magnetic resonance imaging (fMRI) to measure the brain activation of both Chinese and French readers while they performed a semantic task with words written in cursive font. The researchers found that the large-scale neural network for reading is in fact invariant across cultures and modulated by culture-specific processing demands of writing system. The study suggests that cultural variation in the cerebral reading network lies primarily in the different weighting of the universal visual and gestural neural pathways, thus resulting in modulations of the spatial extent and amplitude of brain activity within culturally universal brain circuits.

<http://web1.nsc.gov.tw/techwp.aspx?id=1011228002&ctunit=208&ctnode=287&mp=7>

Related Website:

<http://www.pnas.org/content/109/50/20762.full.pdf+html?sid=e9b06698-8e83-4117-8f64-33a24db31445>

4. NCKU reveals noninvasive optical skin analysis system

(China Post, 10 01 2013)

An optical system to quantify the properties of biological tissues noninvasively, assisting clinical treatment with



more efficient and accurate diagnosis, has been developed by National Cheng Kung University (NCKU), the school said.

The system invented by Dr. Sheng-Hao Tseng from Department of Photonics at NCKU can be used to quantify the superficial skin absorption and scattering spectrum over a wavelength range of 600 nm to 1,000 nm, said NCKU. "It can be applied to detect the concentration of hemoglobin, melanin, collagen and water in the skin and the condition of melanoma and skin aging, helping the doctors diagnose and treat patients faster and more accurately." Said Tseng. Tseng, whose research interests are mainly in the fields of biomedical tissue optics, skin optics and biomedical optics systems, has worked with his colleges and recently published their new findings, "Noninvasive evaluation of collagen and hemoglobin contents and scattering property of in vivo keloid scars and normal skin using diffuse reflectance spectroscopy: pilot study," in the Journal of Biomedical Optics.

<http://www.chinapost.com.tw/taiwan/national/national-news/2013/01/10/366909/NCKU-reveals.htm>

5. Taiwan adjusting focus of climate change research

(Central News Agency, 15 01 2013)

A three-year project to integrate Taiwan's climate science information has come to an end, and a new study on how Taiwan's agriculture and ecology are influenced by climate change will soon begin, a government official said. "We got some good results (from the first project), and we expect to begin the second (project) this year," said Lin Lee-yaw, deputy executive secretary of the National Science and Technology Center for Disaster Reduction (NCDR). The National Science Council launched the Taiwan Climate Change Information Platform (TCCIP) in 2010 in partnership with local universities and research institutes, integrating information and technology around the country, Lin told CNA on the sidelines of an international forum on climate change. The project provided projection data and developed climate change models that can be referred to by policy-makers in the future, he said. Under the US\$3 million project, Lin explained, the impact of extreme events, such as typhoons, can be assessed by means of dynamic downscaling schemes, and the potential change in rainfall due to climate can be calculated. "Such information is valuable and can help reduce casualties," he said. The new plan will support further research on Taiwan's agricultural and ecological environment, which are both vulnerable to the effects of climate change, according to the official. Lin said the mean temperature in Taiwan has risen 1.4 degrees Celsius over the past century, similar to other developing economies but nearly double that of the global mean of 0.74 degrees. "We should do more research to find out the reason as soon as possible and tackle the factors behind the increase," he said. Hsu Huang-hsiung, a professor at Academia Sinica's Research Center for Environmental Changes, also expressed confidence that the project can provide substantial scientific data and research results. The results of the project, along with the Consortium for Climate Change Study and the Taiwan Integrated Research Program on Climate Change Adaptation Technology, can be used to implement the national climate change action plan, said Hsu.

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<http://www.taipetimes.com/News/taiwan/archives/2013/01/18/2003552826>

6. Academia Sinica researchers develop 'molecular dam' for trapping proteins

(Taipei Times, 24 01 2013)

Academia Sinica researchers announced a new approach of using a "molecular dam" to enhance the mass transport of protein molecule enrichment, which could help accelerate the detection of disease in the preliminary stages. Since there are no methods to enlarge or multiply protein molecules enrichment — concentrating or gathering the molecules — must be done before before conducting analysis on protein molecules of lower concentration or quantity, Chou Chia-fu, a research fellow at Academia Sinica's Institute of Physics, told a press conference at the National Science Council. Since the enrichment process often takes a lot of time, Chou's team has developed a "molecular dam" to enhance the speed of enrichment to a single location, for a faster and more accurate detection of the protein. The team, using an electrokinetic technique, developed a nano-constriction device with insulating material, which works like a dam in water and traps the targeted protein molecules, Chou said. Team member Liao Kuo-tang (廖國棠) said other approaches to protein enrichment operations for concentrating a protein to 100,000 times could take about 30 minutes to an hour, the team's approach can achieve the same results in just 20 seconds. The nanoscale molecular dam opens up possibilities for more rapid and sensitive protein analysis and biomarker discovery, and also potential applications in bio-medicine or drug development, Chou said. The team is now trying to apply the approach to rapid detection and early diagnosis of acute myocardial infarction, he said, adding the technique might contribute to the earlier diagnosis of cancers, such as prostate and liver cancer.

<http://www.taipetimes.com/News/taiwan/archives/2013/01/24/2003553315>



7. Taiwan, U.S. universities set up joint language research center

(Central News Agency, 24 01 2013)

National Taiwan Normal University (NTNU) and Pennsylvania State University in the United States announced the establishment of an international research center to promote Chinese language learning. The Advanced Research Center for the Study of Learning Sciences, which will be set up at NTNU, will be devoted to three major fields -- language science, science education and learning technology, university officials said at a news conference in Taipei. The research will include how people recognize and memorize the Chinese language in order to identify those who find it more easy to learn Chinese, as well as to develop "smart classroom" systems that can automatically track students' learning situations. NTNU President Chang Kuo-en said his university will also form a partnership with local computer maker Leo System Inc., with the aim of commercializing the research results of the new center through Leo System's cloud computing platform.

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8. Three Taiwan think tanks rank among Asia's top 40

(Central News Agency, 25 01 2013)

Three think tanks from Taiwan have been ranked among the top 40 research institutes in Asia, according to the 2012 Global GoTo Think Tank Report released recently by the University of Pennsylvania. They are the Taiwan Foundation for Democracy at eighth, the Institute for Social and Environmental Transition at 20th, and the Chung-Hua Institution for Economic Research at 25th. The list of Top 40 Think Tanks in Asia was not comprehensive, however, excluding institutions in China, India, Japan and South Korea. Think tanks from those countries were ranked in a separate list of the world's Top 150 Think Tanks. In the Asia top 40 ranking, the Lowry Institute of Australia was ranked No. 1, followed by the Singapore Institute of International Affairs. The highest ranking Asian institute in the world rankings was the Japan Institute of International Affairs, ranked 16th, followed in 17th place by the Chinese Academy of Social Sciences. No Taiwanese institution placed in the world top 150. The rankings were based on an international survey of over 1,950 scholars, public and private donors, policy makers and journalists. More than 6,500 think tanks worldwide were evaluated using a set of 18 criteria developed by the university's Think Tanks and Civil Societies Program.

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9. Taiwan to begin experimental hand transplants

(Central News Agency, 29 01 2013)

Kaohsiung Chang Gung Memorial Hospital in southern Taiwan said that it has secured Department of Health (DOH) approval to conduct experimental hand transplants. Kuo Yao-jen, director of the hospital's surgical department, said the hospital plans to perform five such transplants over the next five years. The topic of limb transplants drew attention after the Associated Press reported earlier in the day that the first U.S. soldier to survive after losing all four limbs in the Iraq War has received a double arm transplant. The 13-hour operation was led by Taiwan-born W.P. Andrew Lee, who is plastic surgery chief at Johns Hopkins Hospital in Baltimore, the AP report said. The operation, carried out last Dec. 18, is the seventh double-hand or double-arm transplant to be done in the United States, according to the report. Lee was in charge of three of those earlier operations when he previously worked at the University of Pittsburgh, including in 2010 the only above-elbow transplant, which was the first to have been done at the time, the report said. Kuo said he had traveled to the U.S. to study limb transplants under Lee's tutelage. "After nearly 10 years of preparations, our hospital has finally secured the green light from the DOH to conduct experimental hand transplant surgery," Kuo said in an interview with CNA. Nevertheless, Kuo said, the anti-rejection drug the hospital plans to use in the such surgery has not been licensed in Taiwan. "As a result, we will have to try other anti-rejection drugs," Kuo said, adding that the hospital is scheduled to perform the country's first experimental hand transplant within a year. Kuo said that about 53 people around the world have received single or double hand transplants and that only three of them have had to have the donated hands removed because of transplant failure. Wei Fu-chuan, dean of Chang Gung University's College of Medicine, who is also an Academia Sinica academician, said that limb transplants are not especially difficult. "The real challenge lies in rejection control," Wei said, adding that Lee has pioneered novel immune suppression technology that has allowed his patients to take just one anti-rejection drug instead of the combination treatments most transplant patients receive. Another challenge is local people's reluctance to donate organs, including limbs, he added. The following are excerpts from a special report in the Tuesday edition of the United Evening News on the issue: Brendan Marrocco, the first U.S. soldier to survive after losing all four limbs in the war in Iraq, received a double-arm transplant Dec. 18 at Johns Hopkins Hospital in Baltimore. The new arms "already move a little," tweeted Marrocco, who was injured by a roadside bomb in 2009. The 26-year-old also received bone marrow from the same dead donor who supplied his new arms. The novel approach was aimed at helping his body accept the new limbs with minimal medication to prevent rejection, the report said. Lee, who led Marrocco's surgery, told AP in an interview



Monday that Marrocco's "was the most complicated one" so far. "It will take more than a year to know how fully Marrocco will be able to use the new arms," said Lee, who moved to the U.S. along with his family at the age of 15. "The maximum speed is an inch a month for nerve regeneration," Lee explained. "We are easily looking at a couple years until the full extent of recovery is known," he added. Linkou Chang Gung Memorial Hospital Deputy Superintendent Cheng Ming-hui, who is a friend of Lee, said Lee maintains close ties with the local medical community and often comes to Taiwan to attend seminars or give lectures. Cheng said a microsurgery team at his hospital has completed experimental limb transplants on animals and will apply for DOH approval to begin experimental operations on humans. According to the AP report, Lee has received funding for his work from AFIRM, the Armed Forces Institute of Regenerative Medicine, a cooperative research network of top hospitals and universities around the country that the government formed about five years ago. With government money, he and several other plastic surgeons around the country are preparing to do more face transplants, possibly using the new minimal immune suppression approach. (Jan. 29, 2013).

http://focustaiwan.tw/ShowNews/WebNews_Detail.aspx?ID=201301290038&Type=aTOD

10. Research team produces first cloned miniature pigs

(Taipei Times, 31 01 2013)

A Taiwanese research team has produced the world's first cloned miniature pigs, as well as improving a method used to clone animals, which only requires about one-third the manpower and one-sixth the cost of the previous approach. Ju Jyh-chen, a professor in National Chung Hsing University's department of animal science's reproductive biology laboratory, said most people have heard of Dolly the Sheep — the world's first cloned sheep which was produced in 1997. The cloning method used at the time was somatic cell nuclear transfer (SCNT). Although many researchers have since used the SCNT method to successfully produce cloned animals, the cost of the required equipment is high and it takes intensive training of more than a year for researchers to become skilled in the method, Ju said. The Taiwanese team, comprised of researchers from National Chung Hsing University, Chung Shan Medical University, the Animal Technology Institute Taiwan and Tunghai University, referred to a handmade cloning technology invented by professor Gabor Vajta in 2001, and developed a new technique — Oocyte bisection cloning technology (OBCT). The breakthrough of the new method lies in the first part of the cloning procedure, making it easier and faster to operate. "The traditional SCNT cloning method uses a glass micropipette to remove the nucleus from an oocyte [an immature egg cell of the animal ovary], usually removing about one-fifth to one-fourth of the cytoplasm," Ju said, adding that the method may result in the nucleus not being totally removed and therefore affect the cell's development. The OBCT method, based on handmade cloning technology, cuts the oocyte in half and throws away the side with nucleus, resulting in a higher success rate, he said, adding that this procedure can be conducted by one person that has been trained for only a few months, while SCNT needs two to three people to perform the operation. At present, the team has produced two litters of piglets using the new method, and two pigs of the second litter have given birth to new litters of piglets, Ju said.

<http://www.taipeitimes.com/News/taiwan/archives/2013/01/31/2003553878>

<http://www.taiwantoday.tw/ct.asp?xItem=201410&ctNode=445>

11. Potential cancer vaccines unveiled by Taiwan team

(Taiwan Today, 31 01 2013)

A team of Taiwan scientists has developed potential carbohydrate-based vaccines against breast cancer, Academia Sinica announced Jan. 30. Investigators at the Genomic Research Center studied carbohydrate antigens on the surface of cancer cells and cancer stem cells to identify unique biomarkers as targets for vaccine production, Academia Sinica said in a news release. They found one called Globo H on a variety of cancer cells, and devised means of using a carrier protein and adjuvant, a substance that helps increase immune response, to elicit IgG antibodies that destroy cancer cells. One potential vaccine, Globo H-KLH, is now in stage three clinical trials as immunotherapy for breast cancer. The researchers have designed another, Globo H-DT, with a diphtheria toxin as carrier protein, which provides greater enhancement of IgG antibodies. Globo H-DT vaccine immunotherapy is expected to be effective for more than 90 percent of breast cancer patients, compared to 20 percent for conventional treatment with Herceptin, and could be developed into a cure or preventive vaccine, the institute said. A third vaccine candidate targeting a sugar structure known as SSEA4 has also been found to elicit antibodies that are IgG-dominant and very specific to SSEA4. Globo H and SSEA4 are not expressed on normal, healthy cells. Other studies have found Globo H on lung, colorectal, pancreatic, endometrial, ovarian, stomach and prostate cancers, making the new drugs potentially applicable to these other types of cancer as well. The team's research findings appeared Jan. 25 in the U.S.-based Proceedings of the National Academy of Sciences, and were reported on by the American Society for Biochemistry and Molecular Biology.

<http://www.taiwantoday.tw/ct.asp?xItem=201409&ctNode=445>