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The Office of Public Affairs of Academia Sinica held an event on 5 June to present the outcomes of 50 of the latest discoveries by researchers at Academia Sinica to prospective business partners. 31 of the discoveries were related to pharmaceutical biotechnology and agricultural biotechnology, and a further 19 were related to precision instrumentation, optoelectronics, information technology. Among the research presented was the generation of novel five epithelial cell adhesion molecule (EpCAM) antibodies including EpAb2-6, that can induce cancer-cell death and inhibit tumor growth. EpAb2-6 has been successfully converted to a humanized version and EpCAM antibodies can be used for cancer diagnosis and prognosis, and cancer-targeted therapy and molecular imaging. Another was a novel method for the generation of human interferon-producing killer dendritic cell (IKDC)-like cells with anti-tumor activity. The invention provides methods to grow murine and human IFN-producing IKDC-like cells in vitro. Adoptive transfer of murine IKDC-like cells inhibited tumor growth and elicited tumor-specific immune responses in syngeneic tumor-bearing mice and has the potential to treat human cancers. A professor from the Institute of Physics presented three research outcomes. One is a method of electrochemical etching of tungsten tips with controllable profiles. The proposed fabrication overcomes the limitations that result from difficulty in tip profile modification. The proposed fabrication has a simple mechanical set up and does not require an electronic cutoff circuit. A commercial function generator is employed to fabricate tungsten tips with the desired profile. Tips with ultra-high aspect ratio can be obtained. The radius of curvature at the apex can be controlled to less than 10 nm. The surface roughness and cone angle can be controlled independently. The method allows rapid processing and simple setup to prepare single-atom tips at relatively low cost. A Research Fellow from the Institute of Physics released well-received findings outlining a new approach, termed molecular dam, for ultrafast protein enrichment (100,000 fold in 20 seconds) in nanofluidic channels under physiological buffer conditions. He will present three related advanced nanotechnological platforms, including a nanofluidic system to identify specific binding locations of proteins along genomic DNA molecules with sub-100 nm resolution. This device has the ability to distinguish a real protein-DNA complex from a non-specific one, thereby providing more reliable and accurate information. This technique can also be used for other relevant studies such as epigenetic analysis of genomic DNA molecules and drug-DNA interactions. This method also opens up the possibility for a lab-on-a-chip device in which in-vivo complexed DNA-protein samples can be extracted and protein-binding sites mapped. This approach is simpler and easier than existing technologies. (Academia Sinica)

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1. Taiwan develops 'colorful' rice

(Central News Agency, 01 06 2013)

A government-assisted farmers' research group in eastern Taiwan has developed "colorful" rice -- no longer rice in white, but in four different colors -- red, yellow, green and purple. The Hualien District Agricultural Research and Extension Station -- which is dedicated to helping local farmers improve their earnings from farming, including by coming up with new products -- said it has spent seven years developing the technology to add natural colors to rice using vegetables. "The colorful rice can add interest, enrich your visionary sight and increase your appetite, especially for children," the station said. It said that Southeast Asian countries and India have used natural colors to cook rice since ancient times, mostly using tumeric (a plant of the ginger family) and herbs to give rice color. It said that using the natural colors of vegetables to produce colorful rice is both "safe and delicious." The four colors developed by the station -- red, yellow, green and purple --are derived from using anka (red yeast), tumeric, chlorophyll (green pigment derived from green vegetables and anthocyanidin (plant pigment). The station noted that rice colored with anka, tumeric, and anthocyanidin will not change color during the cooking process. The green color, using chlorophyll, however, tends to turn into an olive color after cooking. "The best ingredient is using something that is natural," the station said. It said that it is not only targeting families as the main consumers of colorful rice, but is also eying hostels or leisure farms, which may want to use it for creative dishes. They could also make it a souvenir or gift for visitors, he said. In the earlier days of research into making colorful rice, the technology could only produce a small amount of colorful rice, according to the station. But after further development, it has come up with the technology for mass production, and has obtained a patent. The station later transferred the technology to the private sector, which can now produce two metric tons of colorful rice each day

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2. NTU to develop new cure for HBV

(Taipei Times, 04 06 2013)

Janssen Pharmaceuticals has signed a collaboration agreement with the National Taiwan University (NTU) and the university's hospital (NTUH) to cooperate on developing new drugs for treating hepatitis B. Despite the high success rate of viral suppression achieved by existing medications, the virus is currently incurable. Chen Ding-shinn, chair professor at National Taiwan University Medical College, said that there are more than 350 million people in the world infected with the hepatitis B virus (HBV), 60 to 70 percent of which are in Asia. Every year, more than 600 thousand people die as a result of complications such as liver cirrhosis and liver cancer caused by the virus. "HBV can be transmitted prenatally [from mother to child] or by having contact with an infected person. While less than 3 percent of adults infected with the virus develop chronic hepatitis, more than 90 percent of infected newborns do," Chen said. "Those who have chronic or persistent hepatitis B are at a high risk of developing liver cirrhosis or liver cancer later in life." There are about 2.4 million HBV carriers in Taiwan, Chen said, adding that statistics in 2011 showed that deaths attributable to liver cancer ranked No. 2 on the list of leading causes of death for men and women. "Eighty percent to 90 percent of liver cancer patients had chronic hepatitis B," he said. "However, after Taiwan started vaccinating newborns against HBV in 1984, the number of yearly infections has decreased," Chen said. While the nation's vaccination plan is an effective prevention measure, "having better control over the source of infection is still out of reach. Interferon, an approved medication for treating HBV infections is effective in only one-third of patients, while another treatment, nucleoside analogue therapy, inhibits viral replication without completely eliminating the virus." The collaboration is intended to develop a treatment to tackle the disease, Jansen, NTU and NTUH said in a joint statement. Chen Pei-jer, a professor at the Graduate Institute of Clinical Medicine in NTUH's Medical College and the principal investigator of the collaboration, said the aim is to "accelerate the development of a new hepatitis B drug by combining the resources uniquely held by the respective partners." "NTU has been working in this research field for more than 50 years. NTU's specialization and experience makes it peerless in the fields of drug research and development," Chen Pei-jer said. "Janssen has a large collection of compounds as drug candidates. They need a platform to see whether the candidates are safe and effective," Chen Pei-jer added. From the mouse model first established by the NTU research team for assaying anti-viral and immune-modulatory activity — an important indication of HBV eradication — and the woodchuck model, which demonstrates HBV activity most similar to that of human HBV, to recent clinical research, Taiwan has always been a leader in the field of HBV treatment, Chen Pei-jer said, adding that NTU's research was "a complete line from bench to bedside and back." We are aiming to take the lead in developing a new drug to fully eradicate HBV," the lead investigator said.

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3. MOEA fosters lithium battery breakthrough

(Taiwan Today, 07 06 2013)

Taiwan-based China Motor Corp. will begin using domestically produced high-performance, high-safety lithium-ion batteries, a major success for the ROC Ministry of Economic Affairs' program to boost the local electric car industry. The move, part of an import substitution program, is a big step to making the domestic electric vehicle industry independent of foreign suppliers, the MOEA said June 6. "This can make Taiwan a model for the global electric vehicle industry, attracting international producers and developing export opportunities. By 2016 a new wave of lithium battery-related production worth NT$15 billion (US$502 million) can be created," Deputy MOEA Minister Woody Tyzz-jiun Duh said. To date,29 electric motorbike models from 10 manufacturers have achieved the Taiwan E-scooter Standard and, as of the end of April, sales exceeded 37,000 domestically, with related service and charging stations set up around the country, Duh said. The MOEA is working with Hsinchu-based Industrial Technology Research Institute and vehicle makers to produce innovative lithium battery technology. A recent breakthrough was the development of self-terminated oligomers with hyperbranched architecture (STOBA), which is a nanoscale polymer material added to the lithium battery as a protective film that produces multiple protection mechanisms. The oligomers received a prestigious 2009 100 R&D Technology Award from U.S.-based R&D Magazine and are being employed by four local manufacturers. The high-performance and high-safety batteries made with STOBA means that their endurance and lifespan can be doubled at the same time as weight is decreased by 40 percent, all of which are important considerations for consumers. "This is a key development for electric vehicles and an excellent opportunity for local battery-makers to achieve a commanding position in the global supply chain," Duh added. The MOEA said it will continue supporting domestic research bodies and manufacturers to develop technology for large lithium batteries to ensure the electric vehicle industry flourishes and Taiwan becomes a major international manufacturing hub.

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4. U.S. professor receives Taiwan astronomy award

(Central News Agency, 11 06 2013)

An astronomy professor from the United States received an award in Taiwan that recognizes young scholars who have contributed to the field of astronomy or astrophysics. The Young Astronomer Lectureship Award, jointly presented by National Central University and the Taiwan-based Delta Electronics Foundation, was presented to Christopher Reynolds, a professor from the University of Maryland. Reynolds will receive part of a NT$1 million (US$33,493) stipend that goes to the award's two to three winners every year. This year's other winners will be named in the coming months. Awardees are expected to spend at least two weeks in Taiwan and give a speech at National Central University and another at a designated high school. Reynolds, who is also the director of his university's Joint Space Science Institute, will give a speech at National Central University on June 14 and another at National Taichung First Senior High School on June 15. Both speeches will be related to the topic of the black hole, which Reynolds specializes in, the university said.

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5. Taiwan inaugurates advanced carbon capture plant

(Taiwan Today, 11 06 2013)

Taiwan inaugurated the world's largest carbon capture plant employing calcium looping process technology June 10, according to Bureau of Energy under the ROC Ministry of Economic Affairs. "The plant represents a significant step forward for Taiwan in the development of carbon capture and storage, or CCS, technology," BOE Director-General Jerry Ou said. "It also symbolizes the government's commitment to tackling climate change and helps Taiwan pull its weight in reducing global emissions." Situated in Sioulin Township, Hualien County—a major cement production hub for Taiwan, the plant was built in collaboration with Taiwan Cement Corp. and is the first of its kind in Asia. At present, it can capture 1 metric ton of carbon dioxide per hour, a figure that may be increased with technology upgrades going forward. Using calcium carbonate—a raw material utilized in the production of cement—as the absorbing agent, the technology can capture 90 percent of CO2 produced during the cement manufacturing process and requires less than 20 percent additional energy compared to 30 percent by other technologies. Ou said Taiwan needs to seriously address the issue of greenhouse emissions. "In 2010, the country's per capita and total CO2 emissions ranked 19th and 20th in the world, respectively. "The plant is part of state efforts since 2006 to develop CCS technologies," he said, adding that the government is also working on similar R&D Projects with state-run China Steel Corp., CPC Corp. and Taiwan Power Co. Alex Tong, vice president of state-run Industrial Technology Research Institute, said the ITRI-developed technology can also slash per ton processing costs from US$50 to US$26. "No additional waste will be produced, and the cleaner and higher quality CO2 can be used for other industrial purposes." TCC Chairman Leslie Koo views the facility as a winning model for all parties involved. "We hope this innovative example will inspire more firms to follow suit and contribute to

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environmental conservation." The latest ITRI estimates peg CCS technologies to assist Taiwan reduce national carbon emissions by 4.9 million and 36.7 million tons by 2020 and 2025, respectively. At a cost of US$30 per ton, this will create economic benefits worth billions of New Taiwan dollars for local sectors.

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6. NARL develops research database to improve industry

(Taipei Times, 12 06 2013)

The National Applied Research Laboratories (NARL) said it has integrated data from international research databases and the US Patent Database to create an Intellectual Property Citation Index (IPCI) which can help link advanced research results to industrial development. NARL director Chen Liang-gee said that when he visited AT&T's Bell Laboratories several years ago, several of the laboratory's engineers told him they were studying his research publications to apply the technology into a picture-phone they were developing at the time. He said that when he returned to Taiwan, he noticed that AT&T's picture-phone was sold for more than NT$30,000 per handset. Chen said he realized that research was being done in Taiwan, but the results were being used by the world's best companies in other countries, and then sold back to Taiwan. "Although the number of Taiwanese research publications and publication citations is high, somehow the profits of the related industries have not improved significantly," he said. "We wanted to figure out whether my experience with the picture-phone was just an individual case or a general phenomenon," he said. The IPCI was created to better understand the input of advanced research results into related industries and has collected the data of more than 4.39 million US patents registered between 1976 and last year and the science research publications in Thomson Reuters' Web of Science. Through analysis of the IPCI, Fan Chin-yuan, associate research fellow at NARL's Policy Research Division, said the influence of the nation' s research results on the development of the overseas business sector has increased. Fan said that 496 Taiwanese research citations were used in US patents in 2001, increasing to 3827 citations last year. The index also showed that Taiwan ranked about 15th in the percentage of research result citations used in US patents, showing the quality of Taiwan's advanced research, he said. Lin Bou-wen (林博文), director of NARL's Science and Technology Policy Research and Information Center, said NARL hopes the index will help Taiwanese companies recognize the quality and input potential of domestic academic research and help the academic field to better understand how to link research results to the needs of the industrial sector.

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7. Si2C readies for 2nd stage of biotech development

(Taiwan Today, 14 06 2013)

Taiwan's Supra Integration and Incubation Center (Si2C) announced June 13 that it is ready to embark upon its next stage of development, signaling a further boost for the local biotechnology sector. "We have dedicated more than a year to trial operations and organizational adjustments," Si2C Chief Advisor Soo Whai-jen said, adding that this period was necessary to ensure the center effectively achieves its mission goals. According to Soo, Si2C has identified four medical devices and two pharmaceuticals for R&D. "If everything goes as planned, we will hold a formal briefing on this development in one month." Soo also introduced the center's new management team, including Chief Operating Officer Chen Jia-jin and Chief Technology Officer Wang Ling-mei. The top priority for the center going forward, Soo said, is to integrate and promote the local biotech sector's R&D capabilities and establish the core infrastructure required to cultivate the industry value chain. To date, Si2C has completed assessing the capability and potential of local firms to develop new drugs for lung cancer, liver cancer and tuberculosis, as well as orthopedic materials. "We will continue searching for new opportunities in other areas," Soo said. "Another important task is establishing a seed fund to support early-stage academic research and business startups, and assisting them to secure funding from potential investors." Soo said this undertaking has been made possible with support from the Ministry of Economic Affairs, National Science Council and other public and private contributors. Talent identification and training are also high on the center's agenda, Soo said, citing the continuous implementation of the Stanford-Taiwan Biomedical Fellowship Program and SPARK Taiwan Program, both which seek to cultivate multidisciplinary professionals in high-end medical devices. Established in November 2011, Si2C is part of the ROC government's Biotechnology Takeoff initiative proposed in 2009 to capitalize on the local sector's R&D achievements in pharmaceuticals and medical devices.

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8. Taiwan technology lifts biomedical collaboration

(Taiwan Today, 17 06 2013)

Advanced imaging technology developed by an ROC academic is expected to foster greater global collaboration in the field of biomedical research, according to Taipei City-based National Taiwan University of Science and

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Technology June 17. The Internet-based Real Time Super High Resolution Image Visualization System, developed by Wang Ching-wei—an assistant professor at NTUST's Graduate Institute of Biomedical Engineering—can compress medical images with a file size of 20 gigabytes to 50 megabytes. "Smaller file sizes allow images to be displayed on and transmitted over mobile devices including handsets, PCs and tablets," Wang said. "This facilitates improved telemedicine and borderless research, saving time, money and lives." At present, most hospitals and research organizations use high magnification optical microscopes for viewing images of pathological slides, protein analysis for targeted cancer therapies and stem cell research. Such advanced instruments cost millions of New Taiwan dollars, Wang said, adding that medical institutions have to transport such items for cross-agency collaboration and set aside dedicated storage facilities. "The new imaging technology will also help promote digital pathology in Taiwan and ensure a more even distribution of the country's medical resources," Wang said. "A Taiwan patent for this technology has already been obtained, with applications in the U.S. and mainland China under review." The assistant professor is a renowned expert in medical imaging technology. Along with her NTUST research team, she won first prize in the Fetal Femur Challenge hosted by U.K.-based Oxford University at the 2012 International Symposium on Biomedical Imaging in Barcelona.

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9. Scholars make headway in Taiwan neuroscience study

(Taiwan Today, 26 06 2013)

Studies conducted by a team from the Brain Research Center at Hsinchu-based National Tsing Hua University may hold the key to understanding human behavior and developing therapy for disorders caused by the Alzheimer's and Parkinson's diseases. "A major challenge in neuroscience is to comprehend how internal brain circuits interpret the world and create memories underlying learning and behavior," said Chiang Ann-shyn, the team's lead researcher, June 25. "Understanding how the information flows and turns in the complex brain networks has great and fundamental implication in not only biomedicine but also neuro-inspired engineering," he added. With support from the National Science Council, the team discovered a shunting mechanism for gating information flow in parallel neural circuits. Using a virtual fly brain database containing thousands of single neurons, the team predicted and validated neural circuits relaying olfactory information to higher centers in the Drosophila brain. The team found that odor information takes specific pathways in the brain, depending on concentration context in order to orchestrate locomotive behavior. "Our finding is the first to show that there are parallel neuronal pathways for signal processing and mechanisms that allow information shunting in the brain," Chiang said. "It would be truly exciting if such a mechanism also occurs in the human brain." The research was published in the June 14 issue of Science as "Parallel Neural Pathways Mediate CO2 Avoidance Responses in Drosophila." A renowned neuroscientist, Chiang has been working on brain research for over a decade. The New York Times ran a story on his study in December 2010, when he bar-coded 16,000 of the 100,000 neurons in a fruit fly's brain and reconstructed its wiring map. The scientist caught the attention of U.S-based NBC News in October 2012 when he identified two genes critical to forming long-term memories, again by studying the brains of fruit flies. (JSM)

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10. Local university inaugurates U.K.-Taiwan R&D platform

(Central News Agency, 26 06 2013)

National University of Tainan (NUTN) kicked off a U.K.-Taiwan academia-industry research and development platform and will collaborate with both Taiwanese and U.K. universities to build links through the cooperative platform. NUTN President Huang Hsiu-shuang hosted a press conference to unveil the platform, which was attended by representatives from participating universities, businesses and organizations. The U.K.-Taiwan academia-industry R&D platform includes the U.K's University of Essex, Imperial College London and Coventry University, along with Taiwan's National Pingtung University of Science and Technology, National Cheng Kung University, National Chung Cheng University, National Yunlin University of Science and Technology, HAMASTAR Technology Co., Acer e-Enabling Data Center, and the Academia-Industry Consortium for the Southern Taiwan Science Park. The platform will allow the exchange of knowledge and academia-industry cooperation, as well as technology transfers, and will promote innovations and forge partnerships, according to NUTN. Moreover, using the U.K.-Taiwan platform as a stepping stone, the NUTN hopes to join the Industry-Academia Partnerships and Pathways (IAPP) of the European Union in the future, it added. "Research and business have to work hand in hand. For their own good and for society as a whole," according to the IAPP's official website. Although a valid IAPP project proposal must include partners in at least two different EU member states, partners from other countries can also join in, but only if enough EU members are represented in the partnership, the IAPP website says. In addition to joining the IAPP, NUTN is also looking to collaborate with Taiwan's Education Ministry on building a national remedial education platform and an academic R&D achievement-sharing platform, the NUTN said.

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11. NTHU team map flies' neural activity

(Taipei Times, 26 06 2013)

A research team from National Tsing Hua University (NTHU) has mapped the neural pathways that mediate between external sensory signals and the behavior in a fruit fly's brain, which could bring researchers closer to understanding how the human brain is wired. Funded by the National Science Council, the research team led by Chiang Ann-shyn, a professor of life sciences and director of NTHU's Brain Research Center, said that although the human brain has more than 100 billion neurons, while a fruit fly's has only about 100,000, they share similar basic behaviors and gene regulation mechanisms, so understanding the functions of a fruit fly's brain can provide clues to that of a human. Using fruit flies, which can sense carbon dioxide, the team discovered that contrary to previous assumptions that sensory signals are transmitted through a single neural pathway, they found that three parallel neural pathways activate when a fly senses carbon dioxide, and also mapped the functions of these pathways. "When a fly senses a lower concentration of carbon dioxide, it only activates the first pathway that leads it to perform an avoidance behavior. But if it senses a higher concentration of carbon dioxide, all three pathways are activated, with the third pathway repressing the first, causing the signal to go via the second pathway," said Lin Hui-hao, a team member and lead author of a research paper on the study published in Science magazine this month. Giving the example of railway trains switching tracks, Chiang said they found that the third pathway serves as a "shunting" mechanism mediating signals and responses in the fly's neural pathways. Chiang said that if researchers can determine whether the mechanisms work the same on the fly's other senses, and if human brains operate in the same way, the discoveries could help decode mechanisms in the human brain and prevent or cure diseases such as Alzheimer's, Parkinson's or Huntington's.

http://www.taipeitimes.com/News/taiwan/archives/2013/06/26/2003565700

12. Team generates first-ever iPSC for Pompe disease

(Taipei Times, 27 06 2013)

A research team from National Taiwan University (NTU) and Academia Sinica said it has produced the world's first induced pluripotent stem cells (iPSC) for Pompe disease. Pompe disease is a rare genetic disease and metabolic disorder caused by acid maltase deficiency, and the incidence rate in Taiwan is slightly higher than in many other countries, the National Science Council said. Current treatment through gene recombination has its limits and patients still have to undergo painful treatment, it added. The council-funded research team said it has successfully generated Pompe disease-iPSC from the fibroblasts — a type of cell — of patients, by applying a temporary genetic rescue method, becoming the first Pompe disease-iPSC recognized by the international medical society.
The team said the Pompe disease-iPSC can authentically reproduce the cell phenotype and pathological features of Pompe disease, and it is using the Pompe disease-iPSC to screen for compounds that can reduce apoptosis, or programmed cell death, that can be used to produce medicine. The council said results in the field of stem cell research has good potential for further development in biotechnology and medicine. Citing Shinya Yamanaka, the winner of the Nobel Prize in Physiology or Medicine last year, as an example, the council said the award was a recognition of the Japanese physician and researcher's discovery that mature cells can be reprogrammed and shows the significance of stem cell technology in improving human health. The team from the university has also successfully produced iPSC for premature ovarian failure in the past, and is trying to use the skills it developed to help produce a cure or treatment for other diseases.

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