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- A team at National Taiwan Normal University's Information Technology Center found that Taiwan led the world in terms of the average number of times educational research papers by Taiwanese were cited by academic publications between 2010-2012. The study was conducted by analyzing publication records from scientific citation-indexing services Web of Science (WoS) and Scopus, which covered 216 and 573 journals in the field of education last year respectively. Based on WoS data, Taiwan had 1.73 citations per paper (CPP), trailed by the Netherlands with 1.55, and Scopus data showed that Taiwan's CPP in 2010 was 0.97 (2nd-highest after Belgium). The research was published in the June edition of "Scientometrics."
- The National Science Council (NSC) found that its 2009-2013 National Science Technology Program—energy project has delivered fruitful results in increasing energy independence, reducing greenhouse gas emissions, promoting energy-use efficiency and structural change, as well as creating energy technology research plans. NSC pointed out that the program has achieved success especially in energy conservation technologies such as high-efficiency yellow organic light-emitting diodes, variable frequency drive centrifugal chillers, smart electric grids and offshore wind farm development. A total of 10,560 papers, 9,253 doctoral students, 1,007 patents and 1,069 cases of technology transformation were funded under the NT\$ 25 bio. program, which also generated NT\$ 37 bio. in direct and indirect investment from the private sector.
- Taiwan Semiconductor Manufacturing Co. (TSMC), the world's largest contract chip maker, spent more on research and development than any other Taiwan-listed company in 1H 2013, according to the Ministry of Economic Affairs. The top 300 Taiwan-listed companies spent a total of NT\$230.6 bio. on R&D, +5.7 %, with TSMC spending NT\$ 22.6 bio. (+17.5 %), followed by Hon Hai Precision Industry Co. (assembler of i-phones and i-pads), chip-designer MediaTk Inc. and smartphone maker HTC Corp.

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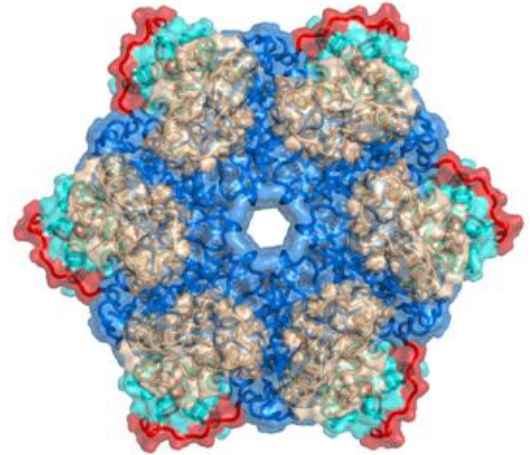
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## 1. Taiwan hot spring bacteria offer new drug strategies

(Taiwan Today, 05 08 2013)

Academia Sinica researchers' success in resolving the structure of LonC protease extracted from hot spring bacteria points to the possibility of developing a new generation of anti-cancer drugs, according to Academia Sinica August 5. The team of researchers at the the Institute of Biological Chemistry of Academia Sinica was led by Research Fellows Chang Chung-i and Wu Shih-hsiung, who first discovered a new type of Lon protease and named it LonC in 2012, Academia Sinica said. They found it in the domestic thermophilic bacterium *Meiothermus taiwanensis* which lives in the hot springs of Wulai, a mountain community south of Taipei. Proteases are complex protein molecules that behave as enzymes—catalyzers of metabolic reactions. When their structures are understood, molecules known as enzyme inhibitors can be designed to block the metabolic activities of cells dependent on normal functioning of protease molecules in cells' organelles. Many modern drugs are enzyme inhibitors. Recently, it has been found that cancer cells and many types of pathogenic bacteria need Lon proteases to live inside a human body, Academia Sinica said. Thus, they have now become possible targets for protease inhibitor drugs which can be tailor-made thanks to the newly revealed structure of LonC protease. "The structure of the Lon protease is so unstable that no enzymatically active Lon protease bound to inhibitors could be crystallized over the past 30 years," Chang said. "We are happy to be the first team to resolve these complex structures of Lon isolated from an indigenous Taiwanese hot spring bacterium." What makes LonC molecules so special, Academia Sinica said, is that they are extremely stable—as they must be in order to withstand hot spring temperatures—whereas other members of the Lon protease family are easily degraded. This stability has enabled the team to crystallize LonC in unbroken full-length form, producing crystals suitable for X-ray diffraction studies that can reveal their structures. Also, the research institution said, as the undegraded individual molecules in the LonC crystals can still carry out their normal enzymatic functions, the research team was able to exploit this factor by successfully loading three different inhibitors into the active site in the LonC molecule's central chamber. X-ray crystallography then allowed them to study the unique binding properties of each inhibitor as well as the structure of the active site. "This study demonstrates that the crystals of the Lon C protease from indigenous Taiwanese thermophilic bacterium are suitable for inhibitor soaking and consequently structure-based drug design," Chang said, adding that a key advantage of this approach to drug development is that target specificity can be narrowed, thus reducing side effects. The team's research was published as cover story in the August issue of *Acta Crystallographica Section D: Biological Crystallography*.



<http://www.taiwantoday.tw/ct.asp?xItem=208105&ctNode=445>

<http://www.chinapost.com.tw/taiwan/national/national-news/2013/08/06/385693/Researchers-move.htm>

## 2. Taiwan's kidney cancers linked to herbal drugs

(Taiwan Today, 09 08 2013)

A Taiwan-Singapore research team has pinpointed aristolochic acid, a key ingredient in many Chinese herbal remedies, as a reason for the nation's kidney and urothelial cancers, according to an article in the latest issue of *Science Translational Medicine*. Taiwan has more than 800 patients per year diagnosed with kidney and urothelial cancer, which prompted the team from Chang Gung Memorial Hospital in Linkou, and the National Cancer Centre Singapore, to search for the culprit. "The kidney, urinary tract and bladder are common places for cancers to occur, but in foreign countries, 95 percent of these cancers affect the bladder," said Pang See-tong, head of CGMH's Uro-oncology Section. "Yet in Taiwan, they are most common in the kidneys and urinary tract, and this can be attributed to the consumption of aristolochic acid." The team found that the acid attacks certain sections of cell DNA, causing mutations that lead to cancer. The acid is found in plants of the *Aristolochiaceae* family, including wild ginger. Pang's group worked with a Singapore team led by Teh Bin-tean, head of NCCS Translational Research Laboratory, to analyze the 30,000-plus genetic markers of the genomes of 10 kidney cancer patients and find where aristolochic acid had provoked mutations. In the process, they found that the acid is the most potent carcinogen yet discovered for these sheath, or epithelial, cells. To confirm their findings, the researchers fed aristolochic acid to rats for three days. Genetic mutations were apparent three months later, and these persisted at the nine-month follow-up. As rats have a life expectancy of only two years, this equated to lifelong, irreparable genetic damage. It was this research that made the cover story of the August issue of prestigious U.S.-based journal *Science Translational Medicine*. Many people consume Chinese herbal medicines of unknown origin or composition, but which could contain aristolochic acid, said Hsieh Sen-yung, director of CGMH Clinical Proteomics Center. As the acid acts as a diuretic, it is often used in slimming aids, cough suppressants and postpartum tonics. Although the acid was banned



in 2003, its effects are enduring, and former users can be at higher risk of cancer. It is also probably the reason why Taiwan has the world's highest rate of kidney dialysis, he added. "Not all Chinese herbal medicines are safe," Teh said. Now that the genetic markers for aristolochic acid-induced damage have been discovered, people carrying them should take care. Further research to pinpoint critical loci of mutational damage could lead to screening tests in future, he added. Aristolochic acid can cause permanent genetic damage and at present there are no techniques for gene repair, Pang added.

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### 3. HPA clinical guide cited in prestigious NGC index

(Taiwan Today, 09 08 2013)

"Taiwan Osteoporosis Practice Guidelines" has become the first Taiwan-produced clinical reference work to be included in the National Guideline Clearinghouse compiled by the U.S. Department of Health and Human Services, according to the Ministry of Health and Welfare Aug. 8. Published by the ministry's Health Promotion Administration, the 120-page English-language book was produced in cooperation with The Taiwanese Osteoporosis Association and the Taipei Medical University's Center for Evidence-Based Medicine. First published in Chinese in December 2011, the English version was later published and was cited in the NGC July 15, the HPA said. The NGC was established by the Agency for Healthcare Research and Quality, a division of the U.S. health department, as a clearing house for evidence-based clinical practice guidelines, HPA Director-General Chiou Shu-ti said. Its purpose is to provide to healthcare workers the world over a comprehensive index of such guidelines so as to speed up the process of clinical evaluation of patients' conditions and needs. Currently, the NGC index includes nearly 2,000 such reference works. In a 2009 nationwide survey of the population's health status, Chiou said, people with abnormal body mass indices (BMI). BMI is a rough measure of weight in proportion to height tended to have higher rates of osteoporosis. One out of four people over the age of 50 with a BMI lower than 18.5—18.5-25.0 being considered optimal—is afflicted with the malady. Those who are underweight tend to produce less estrogen hormone, resulting in accelerated leeching of bone calcium, lower bone density and weakened muscular endurance, Chiou said. Maintenance of an ideal body weight, Chiou added, is helpful not only in preventing osteoporosis, but in preventing high blood pressure, diabetes and arteriovascular diseases. It is important to promote bone mass and density from early childhood, Chiou said, citing three decisive factors: sufficient intake of calcium; adequate exposure to sunlight to stimulate the body's production of vitamin D; and exercise that involves compressive pressure on bones. Sources of calcium include dairy products, black sesame seeds, small fish, traditional tofu and deep-green leafy vegetables. Bone-toning exercises include hiking, jogging, push-ups and weightlifting. Chiou further noted that a number of the exercises recommended by the HPA in its national campaign to promote exercise periods in the workplace can help prevent osteoporosis. A simple regimen of 15 minutes of exercise in the morning and the afternoon can meet the HPA's recommended 30 minutes of exercise per day, 5 days per week. To reduce the rate of calcium leeching from bones, those who already show signs of osteoporosis must likewise give attention to proper diet and adequate exercise. They should follow health experts' recommendations and be especially vigilant to avoid falling and damaging bones. "Taiwan Osteoporosis Practice Guidelines" can be downloaded free of charge at the HPA website, Chiou said.

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### 4. Taiwan makes breakthrough in prostate cancer vaccine

(Central News Agency, 09 08 2013)

A team from Academia Sinica, Taiwan's top research institute, has developed a way to create a vaccine for prostate cancer using synthesized sugar structures, a research fellow said. The Taiwanese team is the world's first to have synthesized the RM2 antigen, a complex sugar structure, which will be linked to a carrier protein to create the vaccine, said Chung-Yi Wu, who led the team along with Academia Sinica President Chi-Huey Wong. The antigen has been found to be a good biomarker for prostate cancer since it increases in amount as the cancer progresses. Cells are covered by sugar structures and the sugar structures on healthy and diseased cells differ, Wu said. These differences can be exploited to develop vaccines that target and kill cancer cells and avoid damaging healthy ones, Wu went on. He said the vaccine has been shown to induce effective antibodies to eradicate prostate cancer cells in mice and added that their research results have been transferred to manufacturers for further clinical studies on animals and humans. Wu estimated that it will be about 10 more years before the vaccine can be put on the market.

<http://focustaiwan.tw/news/asoc/201308090026.aspx>

<http://www.chinapost.com.tw/taiwan/national/national-news/2013/08/10/386039/Team-makes.htm>

<http://www.taipeitimes.com/News/front/archives/2013/08/11/2003569417>

<http://www.taiwantoday.tw/ct.asp?xItem=208407&ctNode=445>



## 5. Study sheds light on prediction of early psychosis

(Taipei Times, 11 08 2013)

Symptomatological and neuropsychological hints can be used to predict psychosis, attending psychiatrist at National Taiwan University Hospital Liu Chen-chung said. Liu made the remarks at this year's International Symposium on Brain and Mind Sciences in Taipei, which focused on early detection and treatment of schizophrenia. In his presentation on the neuropsychological study of early schizophrenia, Liu made public the results of a follow-up study on the psychopathological progress of early schizophrenia-like disorders, a five-year project sponsored by the National Health Research Institute from 2006 to 2010. Led by National Taiwan University professor emeritus of psychiatry Hwu Hai-gwo, the project aimed to follow not only participants with first-episode psychosis (FEP) or ultra-high-risk (UHR) for psychosis, now also called attenuated psychosis syndrome (APS), but also those at intermediate risk and marginal risk of psychosis. "It echoes a recent proposal that if you want to monitor the pathogenesis of schizophrenia, [you should] not only focus on the late prodromal state like APS," but also the earlier stages, Liu said. By conducting a combination of neuropsychological tests, besides the FEP group, putative pre-psychotic participants were categorized into a UHR group, intermediate risk group (IRG) and marginal risk group, with the UHR group divided into those who transitioned into full-blown psychosis during the follow-up (UHR positive) and those who did not (UHR negative). A total of 318 participants, divided into five groups, including the four mentioned above and a control group, were given baseline assessments, Liu said. Liu said that although it was expected that there would be a gradient in the wellbeing of neurocognitive function among the groups, the result "was not so clear." The FEP, UHR and IRG groups all manifested verbal memory and processing speed deficits. "Even [the participants who had been categorized to be at] a very early stage, the MR stage ... showed some cognitive declines," Liu said. And while the FEP group performed worse among the clinical subjects, in terms of the test results, "the difference among the other three groups was not so significant," Liu added. "In some indicators, the UHR negative performed even worse than the UHR positive," Liu added. "The baseline neurocognitive function of UHR subjects [thus] provided limited evidence to differentiate those who converted to FEP from those who did not later on." "And this is why we need to dig into other biomarkers," such as the underlying neural mechanism causing the emergence of psychosis, "to get stronger predictors," Liu said.

<http://www.taipeitimes.com/News/taiwan/archives/2013/08/11/2003569443>

## 6. Taipei Veterans reveals new surgery method

(China Post, 13 08 2013)

Taipei Veterans General Hospital (TVGH) announced that it has successfully developed an intraoperative neuromonitoring (IONM) and functional mapping method for brain tumors and spine surgery. The system, which was developed over the past few years, warns surgeons in certain situations, helping reduce the risk of nerve damage during surgery. TVGH noted that the IONM enables surgeons to identify and confirm nerve function and monitor the functional integrity of certain neural structures during surgery, such as cranial nerves in a patient's head. Since cranial nerves control muscles and all movements of the face, head and neck, patients can suffer temporary or permanent damage if a nerve is irritated or injured. In some cases access to brain tumors is impossible and impedes or prohibits surgery, said Lin Jun-fu, of the neurosurgery neurological institute at the TVGH. The hospital said that it has performed 20 brain tumor surgeries in the past two years with the new technology, which enables surgeons to completely remove tumors in these operations. Patients undergoing these surgeries have not suffered from disabling complications. In addition to brain tumor, intraoperative neuromonitoring can also be used during epilepsy and spine tumor surgery, said Yang Cui-fen, director of the hospital's Physical Medicine and Rehabilitation Department.

<http://www.chinapost.com.tw/taiwan/national/national-news/2013/08/13/386315/Taipei-Veterans.htm>

<http://www.taipeitimes.com/News/taiwan/archives/2013/08/13/2003569599>

## 7. Local research turns soft coral into medicinal products

(The Liberty Times, 13 08 2013)

A series of medicines and cosmetics made from materials extracted from soft coral (the Alcyonacea) is expected to be launched in local markets at the end of this year thanks to the cooperation of local academic units and a private company. The home-grown products were developed by the joint forces of National Sun Yat-sen University, the National Museum of Marine Biology and Aquarium and Uni-President Biotech Co., Ltd. Professor Wen Zhi-hong, director of the joint program from the university's Department of Marine Biotechnology and Resources, says the soft coral reefs have been applied in health protection products in international markets for nearly two decades, and their research of 25 years on the sea-based creatures have also found that they contain active ingredients able to be used in countering infections, mending cuts, suppressing pain, helping heal spinal damage, preventing Parkinson's disease and fighting cancers. After learning that the active ingredients can be generated en masse via a farming system of the soft coral, the university and the museum formed a National Science Council-sanctioned alliance to



transform their findings to the private sector so that they can be produced as merchandise to be sold on the market. They contend that as long as the creatures are raised in fine-tuned environments in aquarium tanks, they will produce enough active ingredients to support the mass production of related products. Wen says that the series of scheduled products have been proven through animal tests where they are able to heal wounds and whiten skin, as well as being able to help skin retain moisture and elasticity in human tests. They are expected to be marketed at the end of this year, though no fixed items have yet been decided. President Yang Hung-duen of the university says that the alliance of transforming the results of oceanic research into marketable products will aim their research at specific creatures that contain potential to become medicinal and cosmetically worthy products. They hope their efforts will turn more active ingredients into commercially worthy activities, and thus boost the competitiveness of related local businesses.

<http://www.taiwanheadlines.gov.tw/ct.asp?xItem=314029&CtNode=9>

## 8. EPA joins NASA in monitoring air pollution

(Taiwan Today, 14 08 2013)

The ROC Environmental Protection Administration cooperated with NASA and six other nations in the region to set up the Seven SouthEast Asian Studies (7-SEAS) network to monitor air pollution, the EPA said Aug. 13. The results from the South China Sea's first such monitoring network are due to be published in the prestigious journal Atmospheric Environment by the end of this year. NASA is the main organizer of the project, the EPA said, which includes agencies from Indonesia, Malaysia, the Philippines, Singapore, Thailand and Vietnam. 7-SEAS aims to monitor how air pollution generated by slash and burn farming and the burning of agricultural waste moves across borders. It also looks at the interaction between pollution from such biomass burning and the environment, radiation and the atmosphere. The monitoring began in February, with measurement stations located in such places as the Thai-Myanmar border; northern Vietnam; Mount Lulin and Hengchun in Taiwan; and Taiping Island and other ROC islands in the Pratas and Spratly archipelagos. Precision instruments were used to measure air quality and pollutants over a four-month period. A total of 14 Taiwan agencies and research bodies joined in the monitoring this year, including the EPA, the National Science Council and Taoyuan County-based National Central University, the EPA said. Time was specially allocated from the experimental schedule of Taiwan satellite FORMOSAT-2 for it to produce high resolution images of the affected areas of the South China Sea to aid in the comparative analysis of the results. Taiwan's participation demonstrates it has the requisite technological skills that are up to international standards in atmospheric quality measurement and has the potential to become a center for monitoring Southeast Asian air quality, the EPA added. As part of the 7-SEAS project, the EPA took measuring devices to Thailand's Doi Ang Khan National Park. Besides determining the chemical signature of pollutants being produced by biomass burning on the Indochinese peninsula, the research also showed that pollutants were carried more than 3 kilometers high into the atmosphere where air currents were able to transport them to Taiwan, affecting air quality in Hengchun and on the western plains. Taiwan is situated downstream of major Southeast Asian air currents, the EPA said, so in 2009 it collaborated with the Coast Guard Administration, Dongsha Marine National Park, Kaohsiung City Marine Bureau, NSC and NTCU to set up a monitoring station on the Dongsha Islands. In 2010, in cooperation with NASA, another measuring device was added, and in 2012 a solar radiation meter was installed on Taiping Island.

<http://www.taiwantoday.tw/ct.asp?xItem=208566&ctNode=445>

## 9. Taiwan makes breakthrough in coral study

(Taiwan Today, 15 08 2013)

A research team from Keelung-based National Taiwan Ocean University has discovered a key element in coral germ cell development, a major step forward in unlocking the mystery of coral reproduction. Backed by the ROC National Science Council, Ministry of Education and NTOU, the team successfully located a DNA sequence that can help identify germ cell development in coral. By observing changes in coral tissues, NTOU researchers discovered that vitellogenin, a benchmark gene commonly used in reproduction studies, can be used as nutrient for coral embryos. The gene's levels are positively correlated to germ cell development. NTOU President Chang Ching-fong, who led the research team, said results of the study were released online in June and will be published in the September issue of international science journal Endocrinology. "Although scientists have uncovered the early development of coral germ cells, their further growth, maturation and spawning still remain a mystery," he said. Coral study is becoming increasingly important as countries around the world try to extend their economic zones by growing reefs, which also promotes biodiversity, he added. "The NTOU findings are the first in the study of non-bilaterian animals, and possess great evolutionary significance," he said. "They will provide the basis for future research on coral reproduction." Chang said his team plans to focus its future research on identifying hormones or other factors that can promote germ cell development or coral spawning. "This approach may increase the prevalence of coral planulae and will greatly help coral restoration efforts."

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## 10. Taiwan team shows how spiders get the jump on prey

(Taiwan Today, 16 08 2013)

Research into how jumping spiders make their death-defying leaps recently won a place in the highlights section of prestigious science journal Nature published Aug. 15 for a team of Taiwan researchers. The study led by biophysicist Chi Kai-jung of Taichung City-based National Chung Hsing University garnered a slew of international media coverage, including articles by the BBC and Wired magazine. It will also be published in the October 6 issue of the Journal of the Royal Society Interface. Jumping spiders, or salticids, can jump up several dozen times their height to land atop their hapless victims. The arachnids do not spin webs, yet still extrude silk. The exact mechanism by which they made their precision pounces, however, was unclear until Chi and her team used stop motion photography and other techniques to study their predation. Their research shows that the draglines the spiders trail behind them serve as a safety line and a steering mechanism, while helping slow descent to ensure a soft landing. They execute their jumps in under 0.15 seconds, faster than the human eye can process them, making the use of high speed photography a necessity to understand the biomechanics of their flight. "Like other jumpers, they strive for stability and smooth landings," the researcher said. "Instead of using inertia from swinging appendages or aerodynamic forces by flapping wings as in other organisms, salticids use a different mechanism for in-air stability by using dragline silk, which was previously believed to function solely as a safety line." The team spent more than a year observing the spiders, shooting high speed video at up to 1,000 frames per second. They compared the behavior of the spider *Hasarius adansoni* to other species which do not use dragline silk. The silkless spiders made clumsy and potentially dangerous landings and required quintuple the time to steady themselves during which their startled prey could escape.

<http://www.taiwantoday.tw/ct.asp?xItem=208646&ctNode=445>

## 11. Spider study helps unlock secrets of balance

(Taipei Times, 17 08 2013)

A study conducted by National Chung Hsing University has revealed how jumping spiders use a silk dragline to stabilize themselves in mid-air and control their landings. Slow-motion footage revealed the spiders use their silk draglines to stabilize their bodies and to brake, enabling them to land poised and ready to pounce on prey. Scientists say that the discovery could inspire new robot design. The findings appeared on the Journal of the Royal Society Interface Web site on Aug. 7 and were also reported on by the BBC and Science News. Interface is a peer-reviewed online scientific journal that started publication in 2004, and includes reviews, research articles and short reports from the interface between physical sciences and life sciences. The study, conducted by physics professor Chi Kai-jung (紀凱容), used high-speed cameras — 1,000 frames per second — to shoot more than 10,000 photographs of the Adanson's house jumper, *Hasarius adansoni*, a species of jumping spider. Chi said academics had concluded that macrovertebrates, such as humans, kangaroos or lizards, maintained balance by using inertia from swinging limbs or tails, while other creatures utilized aerodynamic forces by flapping wings. "My study may have provided a third possibility of how life in nature keeps balance," Chi said, pointing to how the Adanson's house jumper is able to maintain balance — even after flipping in the air — by using one strand of silk. Chi said the key lay in the fact that the spider places a silk dragline on the ground before it jumps, and continues to pump out the silk while still in the air, adding that the spider was able to change direction in the air through tightening or loosening an internal organ, which Chi describes in the article as a type of friction brake. The study discovered that the spider, 6mm in length, was able to jump 80mm horizontally in 1.5 seconds and was able to quickly regain its footing or change direction if it used a silk dragline. Non-silk jumping spiders without the draglines would land badly more often and take five times as long to steady themselves. Chi said that the study integrated research into the kinesiology of spiders and the mechanics of spider silk, adding that the results may be applied to rock climbing equipment as well and robots.

<http://www.taipetimes.com/News/taiwan/archives/2013/08/17/2003569907>

## 12. Taiwan unveils first home-grown bi-color sweet corn

(Central News Agency, 20 08 2013)



The No. 27 yellow-white sweet corn (left) and an existing breed of corn.

The Council of Agriculture unveiled its first bi-color sweet corn that can be grown in Taiwan's baking-hot summer, with the aim of boosting farmers' revenues by two to three times. Developed by the council's research station in Tainan for eight years, the No. 27 yellow-white sweet corn is more heat-resistant than other bi-color breeds favored in Taiwan -- mostly foreign breeds that can only be planted in fall or winter, according to the council. A trial of the No. 27 sweet corn began in June on two farms in Yunlin County, and the new breed can be priced as high as NT\$17 (US\$0.57) per kilogram, compared with NT\$6 to NT\$8 for other local breeds of yellow sweet corn, the council said. "The new breed is easier to grow and is suited to local weather.



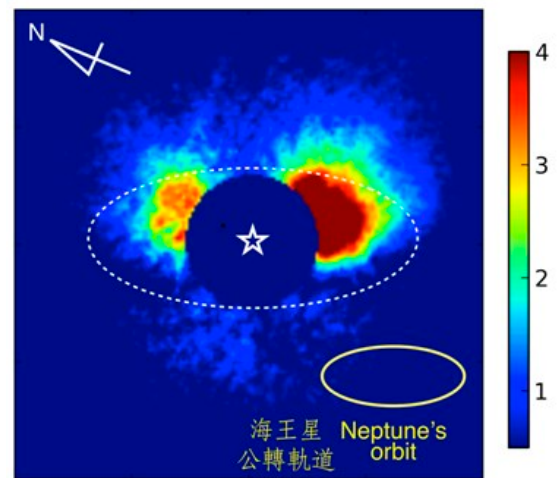
We hope its high quality can help increase domestic farmers' revenues," said Dennis Wang, director of the council's Tainan District Agricultural Research and Extension Station. The new breed's higher price is attributed mainly to the fact that it is sweeter than the yellow sweet corn. The council will start to transfer the necessary technology to local farmers and offer them seeds, with small-scale mass production scheduled for next year, Wang told a press briefing. Taiwan has about 8,000 hectares given over to sweet corn, of which bi-color breeds make up 10 to 20 percent, said Yu Tien-jung, chief of the Puzi branch of the Tainan District Agricultural Research and Extension Station. With the increasing production of the No. 27 breed, the market share of bi-color sweet corn is forecast to rise by 3 percent next

<http://focustaiwan.tw/news/ast/201308200032.aspx>

### 13. Taiwan research may alter theory of planet formation

(Taiwan Today, 26 08 2013)

An international team led by Michihiro Takami of Taipei-based Academia Sinica's Institute of Astronomy and Astrophysics discovered a near-transparent layer of dust in the near infrared in a possible planet-forming disk around a very young star, the academy said Aug. 23. The findings, published Aug. 1 in the prestigious *Astrophysical Journal*, could have important implications for theories of planet formation, as such protoplanetary disks around newly formed stars are thought to provide the material from which planets, moons, comets and planetary rings are formed, the academy said. Exoplanetary research is a very hot field, as new telescopes and imaging techniques have led to the discovery of large numbers of planets orbiting stars outside the solar system in recent years. Takami's team studied the disk around the star RY Tauri, which is about 460 light years from Earth and 500,000 years old, making it a virtual newborn in stellar terms. They used the Subaru Telescope in Mauna Kea, Hawaii to observe the star. The device, one of the largest optical-infrared telescopes in the world, is the centerpiece of the Strategic Explorations of Exoplanets and Disks with Subaru Project. The telescope is equipped with the HiCIAO coronagraph, developed in 2009, which, combined with a new adaptive optics system, has yielded great results in the resolution of the surface of protoplanetary disks. The team captured a near-infrared image associated with the RY Tauri disk, the academy said. Unlike typical protoplanetary disks, the disk emission, scattered light coming from the surface of the disk, is offset from the center of the star. They then performed extensive computer simulations of the scattered light, finding that it is probably not associated with the main surface of the disk, which is the usual explanation for such images. Rather, the observed infrared emission can be explained by the possible presence of a nearly transparent fluffy upper layer. The team suggested the fluffy layer is observed around RY Tauri, but not in many other protoplanetary disks, because the layer is a remnant of dust that fell onto the star and disk during earlier stages of formation. In most stars, this layer dissipates by this stage in the formation of the star, but RY Tauri may still have it because of its youth. The layer may act as a special blanket to warm the inside of the disk, providing a system for planets being born inside and affecting the number, size, and composition of planets being created. The team said that this may be one of the key features for understanding how a variety of exoplanetary systems exist.



<http://www.taiwantoday.tw/ct.asp?xItem=208890&ctNode=445>  
<http://focustaiwan.tw/news/ast/201308230014.aspx>

### 14. NTU entomologists discover new species

(Central News Agency, 25 08 2013)

A team of entomologists from the National Taiwan University (NTU) have discovered a new species -- a tiny wasp that relies on damselflies for procreation. After its verification with the help of experts from the British Museum, the experts made the discovery and solved the mystery of eggs found inside the eggs of damselflies, which are laid on fallen leaves submerged in water. Professor Ko Chiun-cheng and doctoral student Shih Yuan-tung of the NTU's Graduate Institute of Entomology first observed the wasp riding on the back of a damselfly known as *Psolodesmus mandarinus* in New Taipei City. The newly discovered wasp belongs to a genus which contains just four other described species, all from South America. The wasp, named *Hydrophylita emporos*, is the first species of its subgenus that has been found in Asia, and the first observed transporting itself on another organism. Adults of the species measure only 1.2 mm in length. "The specific epithet *emporos* means 'passenger' in Latin, reflecting the phoretic behavior of adult females," the entomologists explained in a paper published in the open-access journal *PLoS ONE*. They found that female wasps would wait by the water for damselflies to lay their eggs. When a



damselfly arrives, a wasp would land on its back, walk down into the water and lay its own eggs inside the eggs of the damselfly. It takes one to three days for the wasp eggs to hatch and the larvae would feed on the damselfly eggs for survival. The team will next study the body mechanism that allows the larvae to swim to the surface of the water, said Shih.

<http://focustaiwan.tw/news/ast/201308250023.aspx>

## 15. ITRI unveils natural semantic technology

(Taiwan Today, 26 08 2013)

Taiwan's first natural semantic understanding technology enabling seamless dialogue between humans and speech recognition systems was unveiled Aug. 21 by Hsinchu County-based Industrial Technology Research Institute. "The technology incorporates speech recognition and understanding, as well as dialogue management and a knowledge database," said Wu Cheng-wen, director of ITRI Information and Communications Research Laboratories. "Utilizing cloud-based, high-speed, big data processing, the technology can recognize a descriptive question and supply the correct answer, demonstrating an advanced level of sentence comprehension." According to Wu, the technology has multiple applications and can be employed by smartphone-makers, as well as system and service providers. "The know-how has already been applied in the film industry, allowing users to search for 14,000 titles released since 2001," he said, adding that a server can deal with 50 enquiries at a time and has demonstrated an 88 percent dialogue success rate. Wu said the technology was developed following the emergence of intelligent mobile devices, in which voice interfaces based on Q-and-A formats simplify the search function. "The ITRI is confident that this innovative technology will generate business, linking smartphones and iPads with dialogue systems, cloud computing content and services, as well as service providers," Wu said.

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## 16. Taiwan tops world in educational research

(Taiwan Today, 27 08 2013)

Taiwan universities topped the world in citations of educational research papers, reaffirming the nation's outstanding reputation in the area, according to a study released Aug. 26 by National Taiwan Normal University. "Local education sector research is respected abroad because Taiwan has strong teacher-training and school systems," said Tseng Yuen-hsien, a research fellow at NTNU Information Technology Center. "These education assets ensure that related experiments and theories can be put into practice in an immediate and effective manner." Tseng said according to Web of Science, an online subscription-based scientific citation indexing service, Taiwan moved from No. 22 in 1990 to No. 1 in 2010 for average citations and remained on top through 2012. In terms of total citations and publications, Taiwan was ranked No. 4 and 8 in the world, respectively, Tseng said. Between 1990 and 2012, the top five Taiwan institutions publishing educational papers were NTNU, 335; National Central University, 217; National Taiwan University of Science and Technology, 166; National Chiao Tung University, 162; and National Cheng Kung University, 157, he added. Tseng said according to Scopus, another academic journal articles indexing service provider, Taiwan was the world's No. 1 in average citations of educational papers in 2011, up from No. 9 in 1996. "Compared to the number of papers published, average citations can better represent the academic values of a country's research in a particular area since quantity may vary depending on the population of a nation." NCU University President Jou Jing-yang said Taiwan's achievement in educational research is closely linked to ROC government efforts in promoting higher education, including the Ministry of Education's Aim for the Top University Project budgeted at NT\$50 billion (US\$ 1.67 billion) over five years. "Compared to other nations, Taiwan tends to use minimal resources to achieve maximum results, a pattern that could be changed," Jou said. "The public and private sectors must learn to see education budgets as an investment in boosting academic research levels and national science and technology strength."

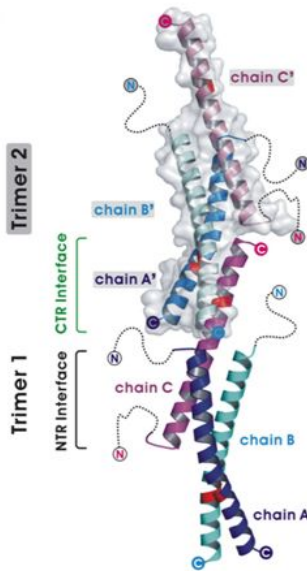
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## 17. Taiwan teams lead poxvirus breakthrough

(Taiwan Today, 27 08 2013)

Two Academia Sinica teams have uncovered crucial details of how the vaccinia virus propagates, which could lead to the production of new vaccines against smallpox and related viruses, the Taipei City-based institute said Aug. 27. Although smallpox was eliminated worldwide following a U.N. campaign, vaccinia virus is considered to be safe for research purposes and researchers have focused on how vaccinia virus structure proteins work to improve future vaccine design. The teams, led by Andrew H. J. Wang at the Institute of Biological Chemistry and Chang Wen at the Institute of Molecular Biology, uncovered the crystal structure of the vaccinia envelope A27 protein and showed the A27 protein trimer, a compound of three macromolecules, is the structural unit critical for vaccinia virus to leave cells and spread. The research was published in the Aug. 23 issue of scientific journal PLoS Pathogens. Protein A27 also





controls viral fusion suppressor complex formation, or the production of compounds that inhibit viral combination, the team found. Deciphering the viral membrane protein structure will aid in design of improved vaccines for the poxvirus family, which includes mouse pox, sheep pox and monkey pox, in the future, the institute said. Vaccinia virus has more than 20 envelope proteins, including the A27 protein, which it shares with pox viruses such as variola and monkey pox, according to the research teams. The protein has multiple functions in the virus life cycle. When the virus enters a healthy cell, A27 mediates the attachment of vaccinia virus to the cell surface. A27 also attaches a viral fusion suppressor protein, A26, to mature virions. During virion morphogenesis, A27 mediates mature virus transport in infected cells. Wang's lab used X-ray crystallography to determine the structure of A27 protein, the institute said. Based on the crystal structure, Chang's lab generated a series of mutant vaccinia viruses that interrupt the A27 protein-to-protein contact interface, resulting in attenuation of virus egress and virus spreading in cells. Chang's lab also demonstrated that A27 protein complex formation is crucial to its biological activity in vivo, and revealed how A27 regulates virus-induced membrane fusion through its ability to form complexes with A26 protein. The researchers said that since A27 is a critical target of neutralizing antibodies against pathogenic poxvirus infection in humans, the findings provide a structural basis for the development of anti-pox drugs and vaccines.

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## 18. Work on Taiwan biotech park to get underway

(Economic Daily News, 27 08 2013)

Work on a national biotech park in the Nangang District of Taipei City will commence in November following three years of planning, according to Taiwan's top research institution Academia Sinica Aug. 26. "We aim to launch the park by the end of ROC President Ma Ying-jeou's second term in 2016," Academia Sinica President Wong Chi-huey said. "Developing the local biotech industry is a key goal set out in the president's golden decade blueprint proposed in 2011."

According to Wong, 70 new biotech firms in fields such as pharmaceuticals and medical equipment will be introduced during the park's early stages of operation, creating 3,000 to 4,000 jobs. Once completed, the park will help cement the future of Taiwan's trillion-NT dollar biotech industry. It complements Hsinchu Biomedical Science Park and Southern Taiwan Science Park in Kaohsiung City, which focus on the development of protein drugs and innovative medical equipment firms, respectively. The park is set to capitalize on the success of such ventures as the Nankang Biotech Incubation Center. Housing eight new firms, NBIC has created 400 jobs in finance, high-level R&D and marketing, attracting investment exceeding NT\$10 billion (US\$333 million). Separately, the Institute for Biotechnology and Medicine Industry said that Premier Jiang Yi-huah and Legislative Yuan President Wang Jin-pyng will hold a briefing Sept. 2 or 10 supporting amendments to the Act for the Development of Biotech and New Pharmaceuticals Industry. The amendments, which extend tax breaks to clinical trial-approved medical instruments with medium risk, are expected to assist the biotech industry in generating investment of more than NT\$100 billion.

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