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Introduction

- Taiwan's science & technology research and development budget for 2009 will be raised to NT\$ 99.7 bio. (US\$ 3.28 bio.), up 8.06 %. This increase will be barely enough to meet President Ma Ying-jeou's expectations to raise R&D funds to 3 % of GDP by 2012 from the current 2.6 %. The annual R&D budget would have to be increased by 8-10 % from now on to attain the target.
- The largest biotechnology exhibition in Asia Pacific region—2008 Bio Taiwan—was held from 24 to 27 July with the aim of providing a platform for biotech companies from home and abroad. For Taiwan it represents a good chance to play an important role by combining its strength of the ICT industries to develop biotech industries, according to ITRI.
- To pursue scientific cooperation between Taiwan and France seven projects have been selected for 2008.

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1. President vows to raise R&D funds to 3% of GDP by 2012

(Sci-Tech Taiwan by National Science Council, 07. 07. 2008)

President Ma Ying-jeou said July 1 that he hopes the country's annual science/technology research and development (R&D) funds can be raised from the current 2.6 percent to 3 percent of gross domestic product (GDP) by 2012. Ma made the remarks while addressing the opening of an annual meeting of academicians of Academia Sinica, the country's top research institution. To attain the target, Ma said Taiwan must increase its annual R&D budget by 8 percent to 10 percent from now on. Given the government's financial straits, Ma said, it won't be easy to achieve such a goal. But the president added that his administration will do its best to increase R&D budget in hopes of realizing the ultimate goal in a gradual manner.

Taiwan's national science/technology research and development budget for 2009 will be raised to NT\$99.7 billion (US\$3.28 billion), up 8.06 percent year on year, but the deputy head of the National Science Council (NSC) said the increase is barely enough to meet President Ma Ying-jeou's expectations. NSC Deputy Minister Chen Cheng-hong said the council hopes to see a higher annual increase in the budget to meet Ma's goals in this regard. Chen said that in a bid to gradually increase the budget over the next four years instead of struggling in the last couple years to meet the president's objective, the NSC will seek to obtain a bigger allocation from the Cabinet for next year's R&D.

Article:

http://stn.nsc.gov.tw/en/view_detail.asp?doc_uid=0970704001

Related article:

<http://www.cna.com.tw/CNAeng/RealTimeNews/NewsDetail.aspx?strNewsDate=&strNewsID=200807240032&strType=EM>

2. Researchers find new approach to fight chronic myeloid leukemia

(Sci-Tech Taiwan by National Science Council, 01. 07. 2008)

Medical researchers at National Taiwan University (NTU) have proved that by enhancing a specific genetic expression, the cancer cells of chronic myeloid leukemia (CML) can be suppressed. The researchers also believe that such an approach can be developed into a new clinical therapy to control, or even cure, chronic myeloid leukemia -- a type of cancer related to the blood and bone marrow. According to the National Science Council, which is sponsoring the project, the incidence of chronic myeloid leukemia in Taiwan is about 0.74 per 100,000 people. Even though there are many effective medications for CML patients, including Gleevec -- an anti-cancer drug with few side-effects -- the cost of treatment could be as high as NT\$60,000 to NT\$70,000 per month (about US\$1,950 to US\$2,300), making it unaffordable for most patients. The other drawback is that although Gleevec can extend patients' life expectancy by up to 15 years, about 20 percent of users develop resistance to the drug. NTU's new approach could one day become an effective, yet inexpensive alternative for treating chronic myeloid leukemia, said project participant Chang Zee-fen, a professor at NTU's Institute of Biochemistry and Molecular Biology.

"What riveted our attention was a gene dubbed Gfi-1B (growth factor independence-1B)," Chang said. "CML cancer cells have the ability to inhibit the apoptosis process, thus extending their life span," he explained. "However, when Gfi-1B's genetic expression is enhanced, with the help of low-dosage arsenic oxides, CML cancer cells will lose their anti-ageing capability and eventually die." Chang noted that with further research, this discovery could help to develop new drugs or new treatments.

Article:

<http://web1.nsc.gov.tw/techwp.aspx?id=0970628005&ctunit=208&ctnode=287&mp=7>

3. EV71 capsid protein helpful in developing enterovirus vaccine: study

(Sci-Tech Taiwan by National Science Council, 07. 07. 2008)

A group of Taiwanese virologists are working to develop a new version of enterovirus vaccine, which uses "decoys" that resemble the live virus to stimulate inherent immune responses to help fight off possible infections. The decoy -- also known as the "virus-like particle (VLP)" -- is a dummy that possesses the authentic appearance, capsid structure, and protein composition of the enterovirus 71 strain.



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"But it is empty inside; no genetic information or infection mechanism of the virus means no risk of infection," said Hu Yu-chen, the project leader and a professor at the Department of Chemical Engineering at National Tsing Hua University. In experiments on rodents, the cultivated EV71 VLP induced a greater immune response compared to conventional vaccines made from inactivated viruses. "The best part is that the immunity can be passed from mothers to children, protecting the newborns for a given time right after birth," said Hu, who conducted the experiments along with six other researchers, including Ho Mei-shang, a prominent immunologist at Academia Sinica.

Baby mice that were born of mothers with immunity to EV71 had a survival rate of 89 percent after being infected with EV71, according to the research paper published by the science journal *Vaccine*. Although the vaccine shows some signs of promise, its development has been hampered by insufficient funding, according to the scientists. Hu and Ho said that more funding is required to carry out the next stage of the project, which aims to refine the techniques of the cultivation and purification of the EV71 VLPs.

Article:

<http://web1.nsc.gov.tw/techwp.aspx?id=0970704003&ctunit=208&ctnode=287&mp=7>

4. Pre-mRNA splicing reversible: study

(Sci-Tech Taiwan by National Science Council, 07. 07. 2008)

Two Taiwanese microbiologists have observed for the first time that reverse modifications exist in the splicing process of precursor messenger ribonucleic acid (pre-mRNA) -- a mechanism that is key to genetic functions. The findings suggest that mistakes made during pre-mRNA splicing can be remedied to prevent the development of genetic disorders, said Cheng Soo-chen, a distinguished research fellow at Academia Sinica's Institute of Molecular Biology who participated in the research.

The discovery by Cheng and Tseng Chi-kang -- a doctoral student at the Institute of Microbiology and Immunology of National Yang-Ming University -- has been presented in the June 27 issue of *Science* magazine, a renowned journal published by the American Association for the Advancement of Science. In genetics, RNA splicing is defined as a process that occurs after transcription to prepare the pre-mRNA for following translation. Transcription is a process by which hereditary information contained in DNA is copied to pre-mRNA, while translation is a mechanism by which mRNA is made to produce protein.

During RNA splicing, introns in the pre-mRNA string are removed and exons divided by introns are reconnected to each other to compose a mature mRNA. Introns are derived from "intra-genic regions," which are the non-coding sections on pre-mRNA, while exons are the "expressed regions" that contain genetic information. Biologists have long suspected that RNA splicing should be reversible if RNA sections are found to be removed or joined mistakenly. However, no evidence has been established to date. Fifteen percent of genetic disorder diseases are related to faulty RNA splicing, including thalassemia, spinal muscular atrophy, and retinitis pigmentosa, said Cheng.

"Although our results have medical potential, it is too early to determine if they are applicable to clinical use," he noted. "Controlled and manipulated reverse modifications to RNA splicing can only alleviate the syndromes by inducing the modified RNA to produce near-normal proteins," Cheng warned, adding that "such genetic disorders can only be cured by gene therapy."

Article:

http://stn.nsc.gov.tw/en/view_detail.asp?doc_uid=0970702003

5. Biologists find new mechanism in DNA damage response

(Sci-Tech Taiwan by National Science Council, 07. 07. 2008)

Researchers from Taiwan, Australia, and the United States have identified a new mechanism in DNA damage response, which will help better understand the cause of cancer, according to Taiwan's top research institution Academia Sinica. The mechanism dubbed "phospho-counting" was discovered during experiments on yeasts by the team led by Tsai Ming-daw, a distinguished research fellow at the institution's Genomics Research Center.

According to the team's research paper published by *Molecular Cell*, when DNA damage occurs, a mechanism launches a repair response to restore the DNA sequences. If the mechanism fails, the damaged DNA can lead to the development of cancer. Tsai explained that similar mechanisms have been discovered before; however, the phospho-counting mechanism carried out by Rad53 kinase is the first one that is found to function in stages.



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Tsai said that when Rad53 -- a key regulator in repairing DNA -- has a single phosphate added to it, or monophosphorylated, only the Rad53 becomes active and the subsequent repair process remains dormant. However, when Rad53 is diphosphorylated, meaning two phosphates have been added, both the Rad53 and the repair response will be activated. Although more details related to Rad53 activity require further research, the findings this time will help understand how cells respond to DNA damage and how it leads to the formation of cancerous tumors, Tsai said.

Article:

http://stn.nsc.gov.tw/en/view_detail.asp?doc_uid=0970702002

6. Biologists developed composite probiotic group without side effects

(Central News Agency, 24. 07. 2008)

A research team at Chaoyang University has developed a new probiotic group that is composed of three strains of lactic acid bacteria and has proved effective in enhancing the functions of the digestive system, officials at the Taichung-based university said. Chen Chee-shan, a professor at the university's Institute of Biotechnology who is leading the project, noted that the group, dubbed ABS composite, was also found to carry no adverse side effects, and thus has the potential to be used in health foods. Comparing the differences between single-strain lactic acid bacterium and the multi-lactic acid bacteria ABS composite, Chen said that the single-strain type usually has at least one bad side effect, such as a tendency to produce intestinal gas or to cause acidosis if too much D-lactic acid is produced. "However, the ABS composite, composed of acidophilus, bifidum, and sporogene, carries no such side effects and will only produce beneficial L-lactic acid," said Chen. Chen noted that with all these benefits, if the ABS composite can be commercialized, it would be very profitable.

Article:

<http://times.hinet.net/times/article.do?&newsid=1644650&option=english>

7. ITRI advises using strength in ICT for biotech industry

(Taipei Times, 22. 07. 2008)

Taiwan has a good chance to play an important role in the biotechnology industry if the nation can effectively integrate its medical research infrastructure with its strengths in the electronics and information industries. By doing so, it could attract international companies to set up bioinformatics research and development (R&D) centers in Taiwan, Hsieh Liang-han, general director of ITRI's international business center told the Taipei Times.

"Taiwan's strength lies in its information and communications technology (ICT) industry and basic research. I believe if the nation's biotechnology industry can integrate with the ICT industry, it will begin to develop at a faster pace," Hsieh said at the sidelines of the 2008 APEC Biotechnology Conference organized by the ITRI.

What Taiwan lacks now in the field of biotechnology is the "link" in the industry value chain. For example, Taiwan may be strong in the basic research of liver disease, but the local biotech industry is still in the development stage, Hsieh said.

Stanley Chang, chairman of the Taipei-based Medigen Biotechnology Corp, who was invited to give a speech at the conference, agreed. "Taiwan is strong in a couple of research topics in the world, with liver cancer being our strongest point. Integrating Taiwan's precision equipment and biotechnology is a new direction that we can seriously consider," Chang told the Taipei Times.

To attract international companies, such as the Switzerland-based pharmaceutical companies Novartis International AG and Roche Applied Science to set up their R&D centers in Taiwan, Hsieh said the government would have to first set up a few centers of excellence, such as in liver disease.

The conference took place at the Taipei International Convention Center yesterday, with "adding value to biomedical translational medicine" being its main theme. Hsieh said ITRI's international business center would focus on linking the laboratory and the "patient's bedside" this year — often referred to as "bench to bedside" — and encouraging transregional cooperation. Biotech experts from seven foreign countries were invited by ITRI to share their experiences and national policies regarding translational medicine at the conference yesterday, in an effort to foster cross-regional interaction and translational medicine collaboration in the Asia-Pacific region.

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8. ITRI holds Cross-Pacific Business Opportunities High-tech Forum in the Silicon Valley

(Industrial Technology Research Institute, 18. 07. 2008)

ITRI held a technology forum in the Silicon Valley in California on the theme "Cross-Pacific Business Opportunities" on 20 June. Delivering the keynote address, ITRI President Dr. Johnsee Lee noted that amid Asia's economic development, Taiwan possesses a number of advantages, namely central geographic location, shared culture with China, high technological abilities and highly trained manpower. Dr. Lee also pointed to the new government's liberalization policies and projects, which will enable Taiwan to play an even more important role in new, technology-oriented business opportunities in the future. Taiwan is poised to become the most important and most innovation friendly route for the Silicon Valley or other Pacific nations interested in entering the Asian market.

Dr. Lee said Taiwan has more than just a geographic or cultural edge for global industries eyeing business opportunities in the Asian or mainland Chinese market. Thanks to its long-term efforts, Taiwan is now in the forefront of Asian nations in employing creative technology to develop new products, new products or new business models. In addition, the government's i-Taiwan infrastructure projects present an outstanding opportunity for international R&D investment, liberalization and the development of emerging technology industries.

For many years, the Taiwan government has supported ITRI's efforts in technology R&D, which have helped to spark industrial development. This has fostered a high-tech industry that is in the forefront from R&D and manufacturing, to global logistics and a vertically integrated industrial supply chain. Taiwan also emphasizes and protects intellectual property, while boasting a highly trained and qualified workforce. This combination of factors makes Taiwan stand above the crowd in Asia. In addition, Taiwan is home to ITRI, an organization that is able to bridge the strengths of the government and industry. ITRI is able to integrate the R&D prowess Taiwan possesses in a variety of fields and use it to develop patent-based new products or services. This close collaboration without a doubt makes Taiwan an important gateway for the development of business opportunities for both Taiwan and foreign companies.

ITRI is displaying 11 technologies with emerging business prospects at the forum. Discussions during the forum will be held on the state of technologies related to flexible electronics and displays, medical care electronics and medical devices, the energy-efficient LEV, energy ICT, multi-core digital signal processing & WiMAX chips, and thin film solar cell/plasma. In addition, this year a special discussion will be devoted to intellectual property rights and start-ups. This seminar will introduce ITRI's patent operations, international patent auctions, ITRI's venture capital business, and its North America incubation operations. Silicon Valley venture capitalists and entrepreneurs, including Innobridge, Care Max Capital, Asia Tech Management and Apace will participate in the seminar, sharing information on cooperation across the Pacific and innovation experience and opportunities.

Article:

<http://www.itri.org.tw/eng/news-and-events/news-detail.asp?RootNodeId=050&NodeId=0501&NewsRoomNBR=173>

9. ITRI's MSL debuts world's first WEDM

(Central News Agency, 23. 07. 2008)

The Mechanical and Systems Research Laboratories (MSL) under the government-backed Industrial Technology Research Institute (ITRI) takes another step towards developing next-generation machine tools with its introduction of the wire electrical discharge machine (WEDM), the world's first WEDM-based poly-silicone pole cutting equipment. The newly developed WEDM features high-efficiency and cost-advantages; while the MSL is seeking to cooperate with Sino-American Silicon Products Inc. to commercialize such equipment, as well as further develop chip-cutting equipment in the near future. The Taiwan-developed poly-silicone cutting equipment coupled with the chip-cutting equipment is estimated to help domestic energy industry generate an extra NT\$6.8 billion (US\$224.42 million) in annual production value.

Su Hsing-chuan, director of the MSL's intelligent machinery section, noted the development of the poly-silicone cutting equipment is derived from the "A+" WEDM machine-tool development program driven by leading EDM manufacturers as Ching Hung Machinery and Electric Industry Co., Accutex Technologies Co. and Joemars Machinery and Electric Industry Co. Su said the WEDM is an advanced machine tool that is applicable to a wide



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range of materials, with the MSL applying for patents in many nations to protect its new tool.

The MSL-developed WEDM can cut poly-silicone pole as thin as 150 microns, compared to 200 microns by wire saw. Accordingly the WEDM can significantly reduce material loss while offering high-efficiency production. In addition, the WEDM has expanded processing scope to cover such non-conductive materials as diamond tools and biomedical molds. To further develop poly-silicone cutting technologies and enhance the international competitiveness of domestic energy industry, MSL is preparing to develop an advanced WEDM which can cut 900 pieces of silicone chips at once, an increase of 225 pieces from the wire saw that is commonly used by the energy industry worldwide.

Article:

http://www.cens.com/cens/html/en/news/news_inner_24104.html

10. Taiwan, France to cooperate on seven scientific projects in 2008

(Central News Agency, 08. 07. 2008)

Taiwan's National Science Council (NSC) and France's Agence Nationale de la Recherche (ANR) have selected seven projects out of 41 proposals to be included in NSC-ANR scientific cooperation in 2008, NSC officials said July 8.

NSC-ANR cooperation began in 2007. The two institutions have agreed that some projects from both countries will be selected annually to be sponsored by the NSC-ANR research fund.

Officials who participated in the annual bilateral meeting of the two institutions in Paris said that of the seven projects, two were chosen from the natural sciences, one was from the engineering sciences, three were from biological sciences and one was from the humanities.

They said that the NSC and ANR will also sign a memorandum of understanding to enhance future cooperation in categories such as medical technology.

Prior to the selection meeting, NSC Minister Lee Lou-chuang said that in general, France is Taiwan's second largest partner in scientific research, trailing only the United States.

"Since 2002, Taiwan and France have collaborated on 217 projects," said Lee, adding that the two countries worked together on 55 projects last year, and 53 projects were initiated in the first half of 2008.

Article:

<http://times.hinet.net/times/article.do?newsid=1612751&option=english>

11. "Galactic cannibalism" identified in Seyfert galaxy

(Central News Agency, 07. 07. 2008)

Taiwanese astrophysicists have proved for the first time that a Seyfert galaxy will devour its neighboring galaxies, indicating that a black hole may exist inside the Seyfert galaxy, according to Academia Sinica. The Seyfert galaxy, a class of galaxy named after its founder Carl Keenan Seyfert, is distinguished for its extremely bright nucleus. Astronomers have long hypothesized that there should be a black hole near the core of a Seyfert galaxy and that the bright light is emitted by the substances consumed by the black hole.

However, there has not been enough evidence to prove the hypothesis before the team led by Jeremy Lim, an associate research fellow at Academia Sinica's Institute of Astronomy and Astrophysics, presented its finding in the June issue of *The Astrophysical Journal*.

In the research paper, the researchers stated that when using the Very Large Array radio telescope of the U.S.-based National Science Foundation, they found that atomic hydrogen gas had been sucked into the center of a Seyfert galaxy, coded AKN 539.

Furthermore, when another galaxy coded PGC 23700360 collided with AKN 539, the hydrogen gas of PGC 23700360 was also drawn to AKN 539, indicating the Seyfert galaxy had been feeding on its counterpart. The movement of the gaseous mass to AKN 539 was observed to form a "bridge" between the two galaxies. And, as the body of AKN 539 is disturbed by PGC 23700360, substances are more prone to be subject to the gravitational attraction of the Seyfert galaxy.

Researchers said that previous research using visible-light telescopes had only partially observed the phenomenon, usually nicknamed "galactic cannibalism" as the galaxies appear to be eating each other, and that only by using radio telescopes and focusing on the changes in hydrogen gas can the whole picture of galactic cannibalism be revealed.



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"Our results show that images of the hydrogen gas are a powerful tool for revealing otherwise invisible gravitational interactions among galaxies," Jeremy Lim was quoted as saying in an Academia Sinica statement. "This is a welcome advance in our understanding of these objects, made possible by the best and most extensive survey ever made of hydrogen in Seyferts," Lim said.

Article:

<http://web1.nsc.gov.tw/techwp.aspx?id=0970702001&ctunit=208&ctnode=287&mp=7>

12. NCTU rolls out RoLA the Robot

(China Times, 15. 07. 08)

National Chiaotung University professor Sung Kai-tai, of the Department of Electronics and Control Systems, has developed a special robot capable of detecting when an elderly shut-in falls down, issuing a real-time visual or network notification to family members. Nicknamed RoLA (short for the "Robot of Living Aid"), the invention was developed in hopes of helping elderly people live better lives in the modern world. To model the situation when an elderly person slips and falls, Chen Hong-che, who is 180 cm in height, patiently "fell" time and time again. Because of his height, it was tiresome for him to fall and get up time and time again. Chen says that elderly people fall when they are careless, but he was falling on purpose. Fortunately, the research and testing went forward smoothly, thus minimizing Chen's career as a stuntman. Although the development process was arduous, Chen was glad to do his part as the tallest person available on the team. "My falling produced the largest acceleration signal," he explains, so that testing on the robot's reactions could proceed.

Sung says that RoLA is not only an autonomous mobile robot, but also links up to the Internet and has a camera link as well. This can facilitate communication between the elderly relative and family members far away. RoLA can sweep points in the environment and sense the bodily position of the elderly person, so that the robot is "aware" of the person's position at all times. It proactively moves to stay with the elderly person, searching for a face, and sends a 3G message and wireless Internet signal with real-time images to notify family members or doctors of a possible injury, so that help can be summoned in a timely manner. Team members are currently working on a second-generation RoLA, hoping to add more features to help and protect the elderly to the newer model, including helping them to move about and preventing falls.

Article:

<http://www.taiwanheadlines.gov.tw/ct.asp?xItem=127076&CtNode=39>

13. Nanowire may change computers

(Taipei Times, 17. 07. 2008)

A new nanowire that may revolutionize the current computer with optical architecture has been successfully synthesized, with the initial steps for mass production already in development, the National Science Council (NSC) said yesterday, adding that computers that are many times faster than present models may be on the horizon. The nanowire, described as a "peapod" wire, was developed by Chou Li-jen and his doctorate student Hsieh Chin-hua as well as a team of doctorate and masters students at the National Tsing Hua University's department of materials science and engineering, under the sponsorship of the NSC.

"Chou's nanowire has been described as a material with high potential as a building block for the next generation optical computers by an array of international experts," NSC Deputy Minister Chen Lih-Juann said. Chen said that the paper had been selected by the highly respected academic journal Nano Letters as a cover story, "[It] marked the first time that a Taiwanese project had received such a level of recognition in the field," he added. Instead of the current computer chips, which rely on electron transmission to send signals of 0 or 1, Chou said his team has proposed a new approach with optical technology since nanowires transmit data at least 10 times faster than electrons. Chou's team synthesized a nanowire composed of evenly distanced crystalline gold nanoparticles embedded in a "pea shell" of insulating gallium oxide nano tube-wires, which can transmit a 0 or 1 signal not through electrons but light, said Hsieh, the paper's lead author. "The mechanism for the transmission relies on the special property of the gold-gallium-oxide nanowire, which is extremely sensitive to lights of 532 nanometers [nm] in frequency," Hsieh said.

When exposed to such light, the gold nanoparticles experience localized surface plasmon resonance, which leads them to produce photocurrents, Hsieh said. "In simple words, this means that the 532nm light induces the peapod nanowire to transfer light into an optical electric current, and sends a '1' signal," he said. Because



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gallium-oxide is a highly insulating material, when it is not exposed to light at 532nm frequency, it sends a '0' signal," he added. Despite the significance of the breakthrough, the success of this development only means that the hardest part of optical computer development is about to begin, Hsieh said. "What we have done is develop the building material for the optical computer. Though other elements such as nanodots and nano switches have also been developed, they now all need to be integrated so that together they can form working devices, which will require the work of interdisciplinary scientists," he said.

Article:

<http://www.taipeitimes.com/News/taiwan/archives/2008/07/17/2003417715>

14. Government to earmark NT\$5.1 b for energy research

(Central News Agency, 24. 07. 2008)

The government has decided to appropriate some NT\$5.1 billion to support a scientific research project to achieve better energy utilization and develop new energy sources, officials at the Cabinet-level National Science Council (NSC) said. They said that the council also selected Lee Si-chen, president of National Taiwan University, as the convener of the energy research project, officially dubbed "The Taiwan National Science and Technology Program for Energy." NSC officials said that Lee will soon begin to invite energy experts from Taiwan and other countries to participate in drafting working guidelines for the program, which will be officially initiated January 2009. According to the council, the program should included research in the areas of energy saving and carbon reduction, development of new energy sources, technology R&D capacity improvement, and other aspects that can help strengthen the domestic energy industry.

Article:

<http://times.hinet.net/times/article.do?newsid=1644331&option=english>