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NTU NEWSLETTER

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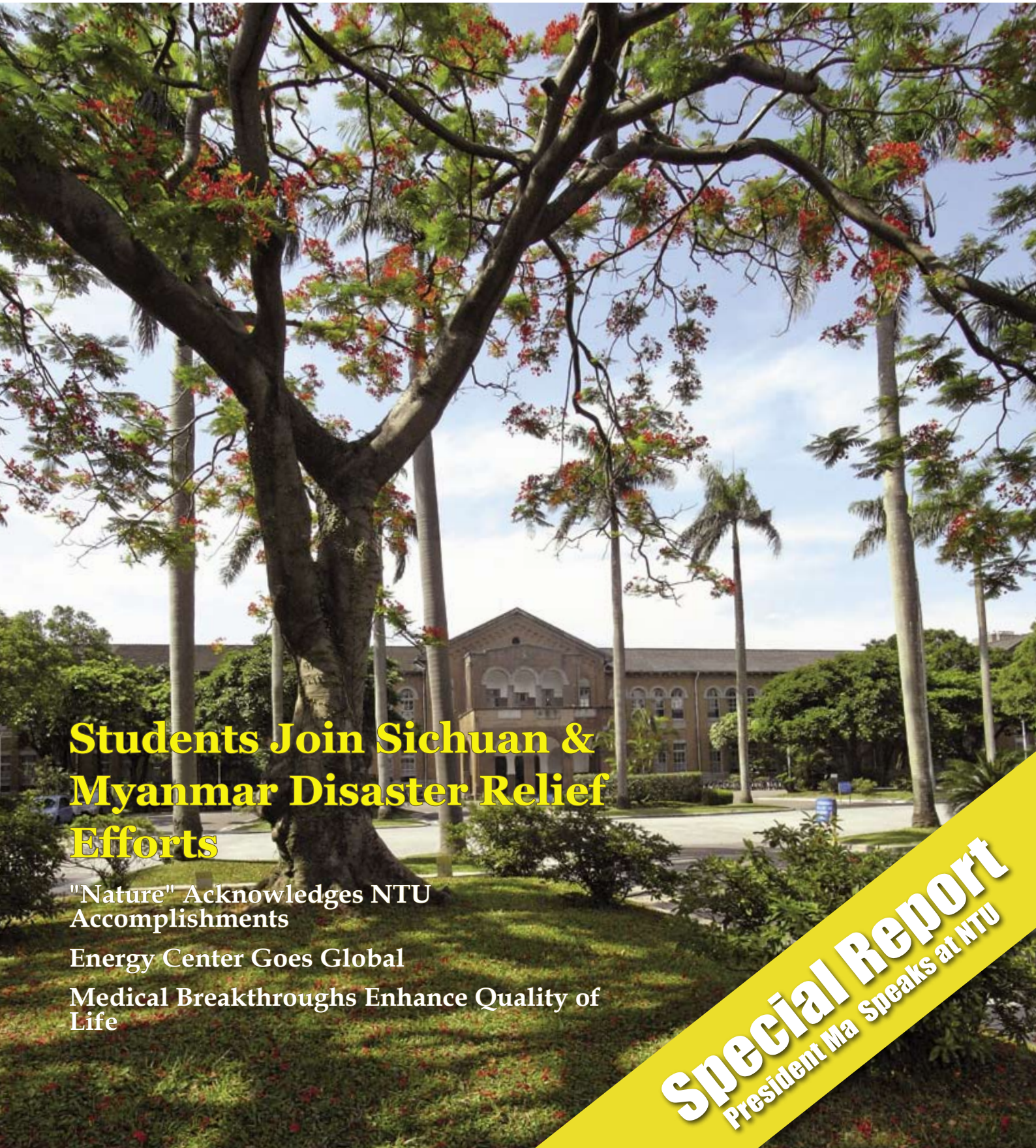


Students Join Sichuan & Myanmar Disaster Relief Efforts

"Nature" Acknowledges NTU Accomplishments

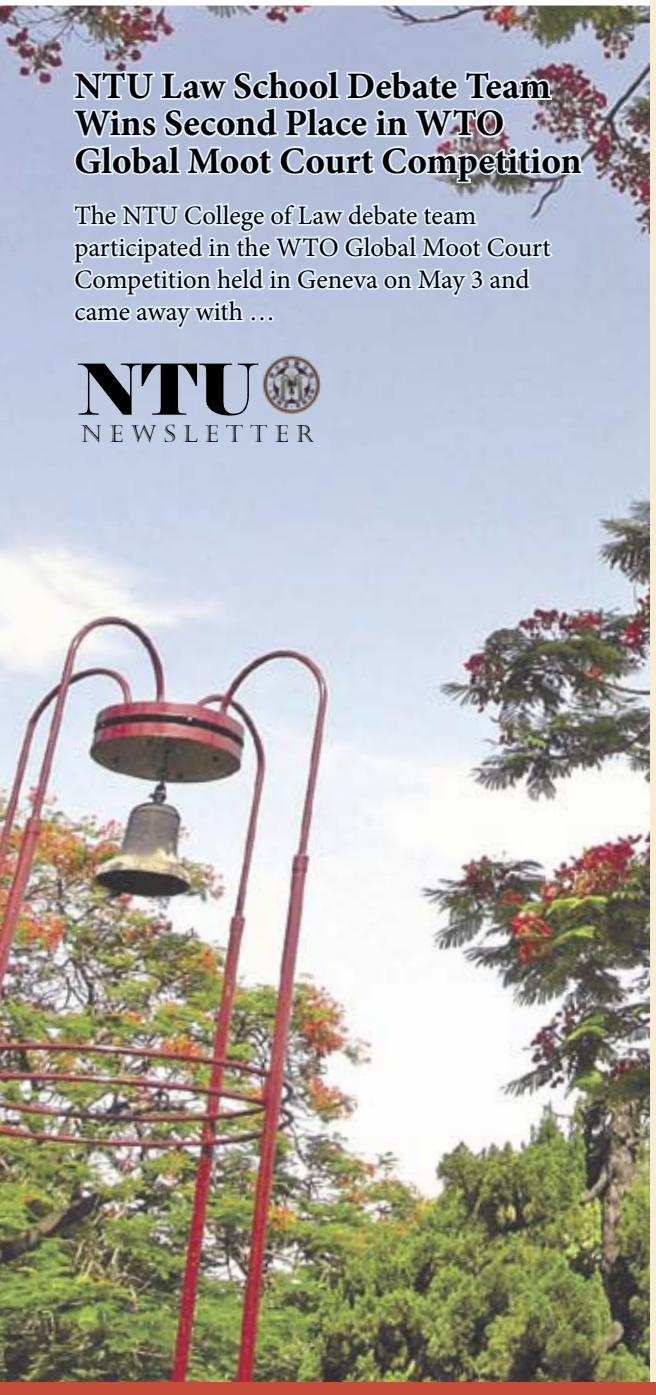
Energy Center Goes Global

Medical Breakthroughs Enhance Quality of Life

Special Report
President Ma Speaks at NTU







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Saudi Arabia's KAUST Selects NTU's New Energy Center for Global Research Partnership

Saudi Arabia's recently-established King Abdullah University of Science and Technology (KAUST) presented NTU's New Energy Center with a Center-in-Development Award under its Global Research Partnership program on May 27. This award provides the NTU research center with NT$130 million (US$4.5 million) over three years to facilitate the development of KAUST's Solar Energy Research Center. While such prestigious universities as Cornell, Oxford and Stanford have received similar awards, NTU is the only Asian university besides Saudi Arabia's King Fahd University of Petroleum and Minerals to receive this honor.

NTU's New Energy Center was awarded a Global Research Partnership by Saudi Arabia's KAUST. Dr. Ji-wang Chern, director of NTU's Office of Research and Development, NTU President Lee Si-chen, Professor of Mechanical Engineering Dr. Bin-juine Huang and Professor of Chemical Engineering Dr. Nae-lih Wu (from left to right) pose for a photograph at the awards ceremony.

KAUST is an international graduate-level research university that was established with an endowment of US$10 billion in 2006. It initiated its Global Research Partnership program in order to attract world-class scientists to collaborate with the university's professors in solving difficult scientific and technological problems facing Saudi Arabia and the world.

The New Energy Center received its KAUST grant for its solar building technology plan. Headed by Professor of Mechanical Engineering Dr. Bin-juine Huang with the assistance of Professor of Chemical Engineering Dr. Nae-lih Wu, the team executing this plan will focus on research into ejector cooling/heating technology, advanced solar collectors for cooling and desalination, solar-assisted membrane desalination, dye-sensitized solar cells, solar-powered LED lighting and indoor LED lighting.

Cooperation with industry is a key feature of this plan and more than six companies have been invited to collaborate on product development and business operations. NTU researchers will work with teams from KAUST and Taiwanese enterprises to demonstrate and field test solar-powered LED highway and indoor lighting, as well as solar cooling/heating and water supply systems in buildings in Saudi Arabia.

Specific challenges the research team will address include: the problems of 1) converting surplus hot water produced by solar powered heat collection systems into the cool air needed in summertime and 2) utilizing solar power for indoor and outdoor illumination.

While solar power and desalination are of deep importance to the desert kingdom, KAUST notes that these technologies will play a significant role in mitigating global warming and reducing energy consumption in other nations as the world increasingly faces oil shortages.

The successful development of these solar-power building technologies could have a far-reaching and profound impact on the solar power and LED industries--even the construction industry in Taiwan--and open up new initiatives for economic development and reducing global warming.

Besides helping KAUST set up its Solar Energy Research Center, NTU will provide educational services through faculty and student exchange programs in related research fields.

President Ma Ying-jeou Speaks at NTU Symposium to Address Academia's Expectations for New Government

President Ma Ying-jeou spoke at the opening of a Symposium addressing academia's expectations for the nation's new government on the NTU campus on May 24-25.

President Ma noted that among the six presidents who led Taiwan since 1947, three, Lee Teng-hui, Chen Shui-bian and Ma himself, were graduates of NTU. Ma added that NTU graduates have served as president of Taiwan for the entirety of the nation's democratic era.

President Ma noted that NTU stands not as an ivory tower, but as the conscience and vanguard of Taiwan society and that he looks forward to hearing the reasoned opinions of NTU's eminent professors and, when suitable, incorporating them into his policies as he leads the nation.

Regarding the topics on the agenda of the two-day Symposium, President Ma declared that the policy goals of the new administration include: rediscovering Taiwan's core values, revitalizing Taiwan's economic strength, ensuring respect for Taiwan and opening the way to a bright future for Taiwan.

Ma characterized his administration as one that will listen to the people and practice self-examination, cultivate respect for the constitution, stress local values and Taiwanese consciousness, and create opportunities.

For his part, NTU President Si-chen Lee stated that NTU has never been absent at the crucial moments in Taiwanese history and that the university bravely shoulders the responsibility of educating the nation's students.

NTU Student Groups Join Hands to Raise Funds for Disaster Victims in Sichuan and Myanmar

An alliance of NTU student clubs and associations joined hands during the week of May 19 to 23 to raise money and express their concern for the victims of the recent earthquake in Sichuan Province, China, and Cyclone Nargis in Myanmar's Irrawaddy Delta. During this weeklong fundraising effort, donation collection boxes were placed around campus. The funds collected were to be given to an international non-profit organization in the name of NTU students and faculty.

Among the groups participating in the donation drive were the NTU Fellowship Society, Tzu Chi Youth Club, Fishing Village Service Club, SDB Community Service Group, Hong Kong and Macau Student Association, League of Friends of Outdoor Living, Single Parents Social Service and Support Club, and Jane Goodall Root and Shoot Club.

Also, on the night of May 16, students assembled on the lawn in front of the NTU Library to announce the fundraising effort for the victims of these devastating natural disasters. During this event, students held a candlelight vigil and placed folded paper cranes on maps of Sichuan and Myanmar to express their concern.

The student organizers hoped this would provide NTU students and faculty with an opportunity to express their humanitarian spirit and that students at other schools would organize similar activities.

NTU Delegation Attends 2008 ASAIHL Conference in Thailand to Learn About Borderless Education

The Association of Southeast Asian Institutions of Higher Learning (ASAIHL) is a non-governmental organization founded by eight Southeast Asian public universities in 1956. Over the past fifty years, ASAIHL has made significant contributions to academic collaboration and development among member institutions in the region. As the only member institution from Taiwan, NTU has participated in many ASAIHL events, including the recent 2008 annual conference and board meeting held at Sukhothai Thammmathirat Open University in Bangkok, Thailand, April 7 to 11. In 2010, NTU will host the board meeting and general conference on energy efficiency here in Taipei.

This year's conference theme was Borderless Education:Challenges and Opportunities for Southeast Asian Universities, focusing on four sub-themes: 1) Universities at Crossroads: Changing Education Context, 2) Educational Programmes and Management: Offshore and Outsource, 3) Quality Assurance and Recognition of Qualification, and 4) Blended and E-learning: Innovative Technologies and Learning Resources. Over sixty presenters from Thailand, Malaysia, Brunei, Cambodia, Hong Kong, Indonesia, Philippines, Sri Lanka, Singapore and Vietnam shared their insights into the potentials and limitations of E-learning at higher education institutions. Conducted in English, the conference was attended by hundreds of participants, including university administrators, lecturers, researchers and post graduate students from member universities as well as representatives from institutions of higher learning in other parts of the world.

In addition to participating in the three-day conference, the NTU delegation, which included Vice President Tai-Jen Chen, Dean Tung Shen and Regional Program Manager Yen-Ju Chuang from the Office of International Affairs, also took part in the ASAIHL board meeting where thirteen issues concerning future events and improvements were discussed in depth. Vice President Chen and Dean Shen also took the opportunity to visit Thailand's Asian Institute of Technology, a partner university of NTU since 2005. This short visit strengthened the partnership between the two universities and opened up more opportunities for cooperation.

Southeast Asia is one of the world's most rapidly developing regions, and NTU's membership in ASAIHL helps to keep our faculty and students up-to-date regarding the latest research and collaboration opportunities with other academic institutions in the region.

Vice President Chen and other ASAIHL board members

Nature Publishes NTU High Energy Physics Article on Disappearance of Antimatter in Universe

The NTU High Energy Physics Group collaborated with the Belle lab of Japan's KEK High Energy Accelerator Research Organization, and their findings were published in *Nature* (March 20, 2008). This is the first time in over ten years that experimental results from a B meson factory were published in *Nature*, testifying that Taiwan's high energy physics researchers are in step with the world's leading physicists.

Dr. Pao-ti Chang of the Department of Physics pointed out the puzzle: if it were true that the universe was formed by a giant explosion, then equivalent amounts of matter and antimatter would have been created at the beginning of this genesis. But, in that scenario, our universe would have disappeared long ago, since the colliding matter and antimatter would have produced massive smoke, lightning—total annihilation. Curiously, virtually all of the antimatter is gone. When we look around-- from planet Earth to the ends of the universe-- we see only the presence of matter. Consequently, in the world of high energy physics, the scientists' dearest dream is to offer an explanation of where the antimatter in the universe has gone.

According to Dr. Chang, to explain the disappearance of antimatter one must understand that matter and antimatter one are different in their basic characteristics. This difference is labeled by physicists as "charge-parity violation," a phenomenon first observed in 1964. The disparity can be observed in the laboratory; however, the Standard Model in modern fundamental particle physics can explain only 1/10,000,000,000th of the imbalance between matter and antimatter, and thus lacks explanatory power regarding this puzzle. Since then, the dream of high energy physicists has been to conduct research on this charge-parity violation in the hope of discovering a new physics principle that would go past the Standard Model and explain why the world persists as it does.

The NTU High Energy Physics Group has participated in the KEK Belle lab B meson factory international experiment in Tsukuba, Japan, for many years. Recently, the group discovered that, as a charged B meson decays into a K meson and a p meson, its direct charged parity asymmetry does not match the asymmetry derived from a neutral B meson decaying into a Kp meson. The difference in the two direct charged disparities is likely brought about according to an, as of yet, unknown physics principle. Therefore, this experiment may provide clues to solving the mystery of antimatter's banishment from the universe.

The study of charge-parity violation requires enormous amounts of precise data because particle phenomena are very sophisticated. At the

end of the 20th century, there were only two B meson factories conducting research on charge-parity violations—the KEK's Belle lab in Japan and the BaBar Lab at Standford's SLAC Center. NTU's High Energy Physics Group was invited to join both of these labs when they were established. A group of scientists led by Dr. George Wei-shu Hou, a theoretical physicist, was anxious to fulfill its dream, so they joined the B meson factory experiment in Japan. Initially a small team of just four scientists, the group has grown to over 30 and has enjoyed substantial results in research and international competitiveness. While the NTU group accounts for around only 1/20th of the manpower of the Belle lab, it has published approximately 50 papers, that is, roughly 1/5th of the total number of papers published by scientists at the lab. Moreover, in 2004, the research team found evidence of direct charge-parity violation in neutral B meson decay. This finding was considered the most important achievement in the field of high energy physics that year.

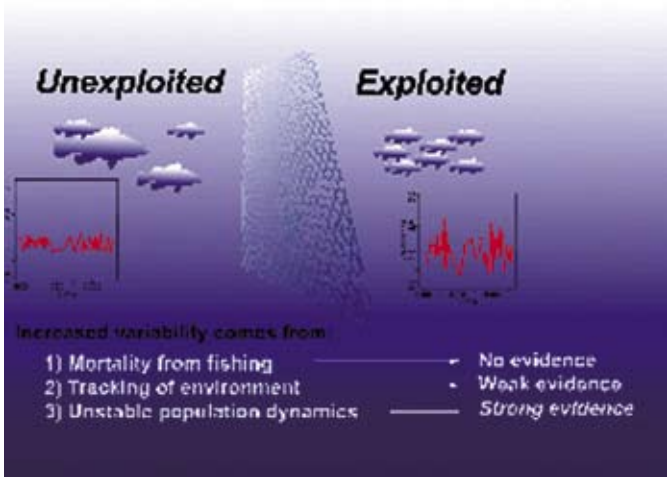
The paper published in *Nature* reported that, as B mesons decay into Kp mesons, charged and neutral B mesons differ widely in their charge-parity violations. These differences run counter to the expectations of received theory. How do these differences come about? Many theorists admit the Standard Model cannot account for this phenomenon, now known as the Kp puzzle. Some theorists attempt to explain it using the theory of strong force interaction, while others maintain that the puzzle might best be solved according to a new principle that goes past the Standard Model. According to particle physics today, if the difference is caused by strong force interaction, we need to make some major revisions in our understanding of strong force interaction as conceived in B meson decay theory. For this reason, the editorial board of *Nature* published the NTU High Energy Physics Group's findings, one of the few articles published in the journal on high energy physics.

Major Research

Dr. Pao-ti Chang's Website:
http://www.phys.ntu.edu.tw/english/index_noflash.html

Dr. George Wei-shu Hou's Website:
http://www.phys.ntu.edu.tw/english/index_noflash.html

Research Findings of NTU Ecology Statistician Dr. Chih-hao Hsieh Published in *Nature*



Exploring the influence of fisheries on the fluctuations of fish abundance—the increase of younglings is the primary factor affecting the destabilization of fish populations.

Assistant Professor Chih-hao Hsieh, a member of the NTU Institute of Oceanography, was a member of an international research team that published its findings in *Nature* (April 17). The research team examined the effect of commercial fishing on fluctuations in fish populations and gathered compelling evidence that commercial fishing indeed increases both volatility of fish abundance and risk of destabilizing demographic parameters within species. Besides this article in *Nature*, the findings were reported in *Nature's* News and Views section, Science Daily, Reuters and other international media.

A team of scientists from the United Kingdom, the United States, Japan and Taiwan gathered evidence on the effect of fishing on commercially exploited fish populations. Their study confirmed that fishing is basically size-selective in typically removing large individuals from the fish population, leaving only the fast growing young fish. In the long run, such fishing activities will lead to the low-age phenomenon in the "age pyramid" in fish populations, because removing the few large older fish at the top of the pyramid results in leaving a broad base of faster growing small young fish.

The research team found that such a rapidly growing and transitory base of younger fish is dynamically unstable. Under such conditions, the number of fish increase significantly with time, raising the risk of destabilization of demographic parameters within the population. This finding is crucial for fishery management and maintaining sustainable ecosystems.

Traditionally, the fishing industry has selectively preyed on large-sized fish; and, in order to protect smaller fish, most fishing regulations impose restrictions only on the size of the smallest mesh. As a result, fishing policies intended to maintain the population of a target species often overlook the importance of size and age structure for the dynamic stability of the target fish. They thus fail to take into account the risk of the demographic destabilization of the species caused by excessive decreases in the number of large fish. This risk could eventually permeate the ecosystem, and, like a stock market crash or the so-called domino effect, it would eventually endanger the fishing industry itself and related industries.

This study is based on data gathered by a research program that has monitored fish populations and oceanographic activities in the California Currents for more than 50 years. This study demonstrates that long-term ecological monitoring programs are essential to the effective management of fisheries and the sustainable development of ecosystems.

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- "Destabilized fish stocks," News and Views in *Nature,* April 18, 2008
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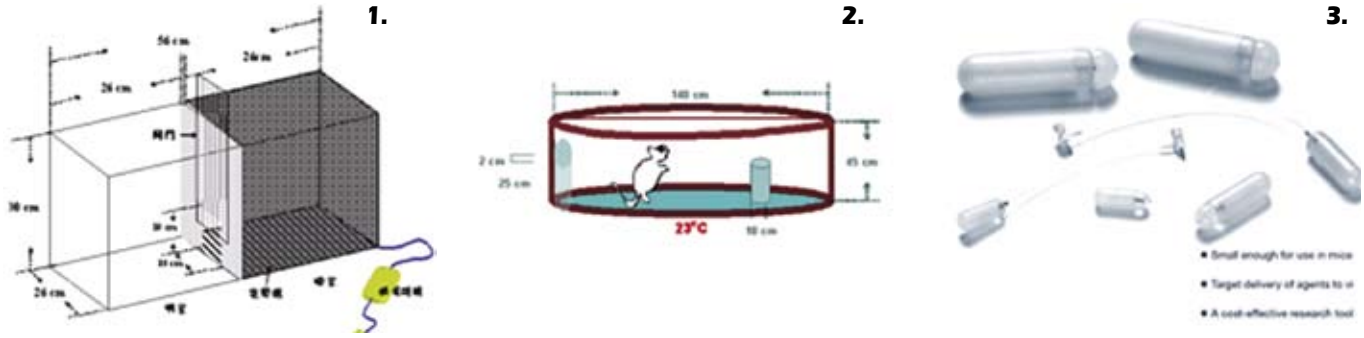
- Professor Hsieh's personal website: http://homepage.ntu.edu.tw/~complex/ecoinformatics_c.html

Microbiologist Tzu-ming Pan's Findings that Monascus Fights Alzheimer's Published in *Journal of Neuroscience Research*



1. Passive avoidance test equipment **2.** Water maze test equipment. The water maze contains a circular water reservoir in which is placed a mobile platform for resting. **3.** Minimotors for injecting amyloid proteins. The size of these minimotors is roughly the size of ordinary capsules.

NTU microbiologist Dr. Tzu-ming Pan has demonstrated that the fermented products of Monascus possess antioxidant and anti-inflammatory functions and the capability to inhibit the deposition of amyloid protein in Alzheimer's disease patients. They have also confirmed that Monascus is useful in delaying the deterioration of Alzheimer's patients and in improving their memory and learning abilities. These groundbreaking findings have been published in the *Journal of Neuroscience Research* and posted on the website of *Applied Microbiology and Biotechnology*, and have attracted attention from medical circles worldwide.

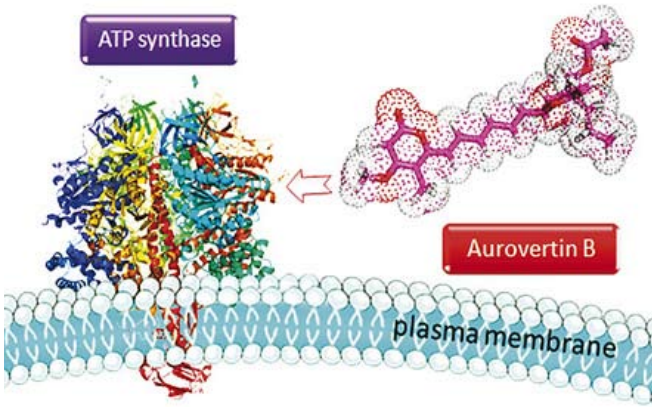
Dr. Pan's research team injected amyloid protein into the hippocampuses of hamsters, afflicting the hamsters with Alzheimer's disease. The researchers then compared groups of hamsters that had been fed different doses of red yeast rice containing Monascus or none at all in terms of their memory and learning capabilities.

Their findings indicated that the hamsters that consumed the red yeast rice proved to be smarter and know to avoid danger. They were also better at reference memory and working memory, and could find their targets in less time. The anatomy of these hamsters' brains revealed that the deposits of amyloid protein were significantly less in the brains of the hamsters that had been fed the rice.

Although their brains were damaged by amyloid proteins, the Monascus played a protective role, preventing the fibrosis of the amyloid proteins, and helped to reduce the deposition of the amyloid proteins in the hamsters' hippocampuses. The researchers also found that Monascus could enhance the generation of neuroprotective agents and improve a person's memory and learning abilities, indicating Monascus could prevent Alzheimer disease from worsening due to high-cholesterol and high-calorie diets.

Professor Pan has noted that Chinese people have used Monascus in their food and medicine for thousands of years. Monascus contains many physical attributes of metabolites, of which present studies have found monacolins, which are effective in lowering the synthesis of cholestrals, and GAGA, an amino acid effective in lowering blood pressure. In addition, Monascus contains antioxidants and multi-functional materials that can be used to prevent Alzheimer's disease. Judging by the doses used in the animal experiments, a human needs only to take 2 grams of NTU 568 red yeast rice every day to stay healthy. NTU is at present conducting a technology transfer aimed at developing Monascus into a new type of health food.

NTU Scientists Draw Attention of World's Science Media by Providing First Evidence that Blocking Key Energy Protein Kills Cancer Cells



Right: Dr. Juan's research team is the first to discover that blocking a key energy protein kills cancer cells, a finding that could lead to the development of newer and more effective anti-cancer therapies.
Under: Associate Professor of Life Sciences Dr. Hsueh-fen Juan

The latest research conducted by a team led by Associate Professor Hsueh-Fen Juan of the Department of Life Sciences has demonstrated that blocking a key energy-supplying protein enzyme can effectively inhibit the growth of cancer cells. Dr. Juan's new findings were published in the *Journal of Proteome Research* (April 4, 2008), and were chosen by the American Chemical Society as a weekly hot news topic, and subsequently posted on the website *ScienceDaily*. This response shows that NTU's research achievements in the area of the life sciences have received international recognition.

On March 31, *ScienceDaily* reported that researchers from Taiwan first discovered that blocking a key energy protein kills cancer cells and that ATP synthase inhibitors may in the future be used for medical purposes, possibly providing newer and more effective anti-cancer treatments.

For their research, Dr. Juan and her colleagues focused on ATP synthase, a key protein involved in producing the energy-rich molecules of ATP that power all life processes. For years researchers thought the protein existed only in mitochondria, structures located inside the cells that convert nutrients into energy. However, recent studies have found high levels of ATP synthase on the surface of cancer cells. The medical implications of this discovery had gone unexplored until Dr. Juan's research.

The research team analyzed tissue samples from breast cancer patients and found for the first time that the surface of breast cancer cells contained high levels of ATP synthase. In cell studies, exposing breast cancer cells to a substance that blocks ATP synthase, in this case the ATP synthase inhibitor aurovertin B, killed the cancer cells, but did not harm normal cells. The team's report states that aurovertin B inhibits the proliferation of breast cancer cells by inducing apoptosis and arresting cell cycle at the G0/G1 phase. The findings suggest that ATP synthase inhibitors may represent a new approach for fighting breast cancer and other cancer types through chemotherapy.

That these findings have attracted the attention of the international science media shows that the level of NTU's research in the life sciences is on a par with international standards. Members who participated in Dr. Juan's study include graduate students from the Institute of Molecular and Cellular Biology Tsui-ching Hwang and Hsin-yi Chang, Associate Professor Chun-hua Hsu from the Department of Agricultural Chemistry, Dr. Wen-hon Kuo from the Surgical Departmnet of NTU Hospital and Dr. King-jen Chang from NTU's Angiogenesis Research Center. Their successful endeavor is a shining example of the cross-disciplinary research going on at NTU.

NTU Law School Debate Team Wins Second Place in WTO Global Moot Court Competition

The NTU College of Law debate team participated in the WTO Global Moot Court Competition held in Geneva on May 3 and came away with an impressive second place finish. This performance is by far the best one by the NTU team in the three years it has taken part in this event. Sixteen teams had qualified to join the event by taking first or second place in regional competitions, based on four criteria: legal analysis, reasoning, style and timing. A grand panel of seven judges crowned Colombia's University of the Andes team as the competition winner by a slight margin over the NTU team. Belgium was the second runner up, while Germany took fourth place.

The NTU debate team includes four graduate students from the Institute of Interdisciplinary Legal Studies: Miss Tsai-ping Tang, Mr. Ding Jin, Mr. Wei-jen Chen and Miss Juan-yu Chen. Mr. Jin distinguished himself by winning the best orator award in the preliminary rounds as well as in the final oral round. This was quite an accomplishment for a student from Taiwan in a world competition.

Group photograph of The NTU College of Law debate team in the WTO Global Moot Court Competition

The official website for NTU's WTO Center is: http://www.law.ntu.edu.tw/center/wto/index.asp

NTU Team Takes Second Place at ACM/IEEE ISPD 2008 Global Routing Contest

Professor Yao Wen-yang, Graduate Institute of Electronics Engineering and Department of Electronics Engineering, together with GIEE Ph.D. candidates Huang-yu Chen and Chin-hsiung Hsu, took second place with their NTU global router at the ACM/IEEE International Symposium on Physical Design 2008 Global Routing Contest in April, besting nine teams from the United States, Europe and China. This achievement also earned the team mention in EE Times, the most important weekly for the global semiconductor industry, which called the ISPD, "the premier forum for sharing leading-edge results in chip-design methodologies," and reported on, "how the Taiwanese beat both the U.S. and Europeans in the ISPD Global Routing Contest."

The research team points out that the Association for Computing Machinery and the Institute of Electrical and Electronics Engineers are the world's most authoritative organizations in the fields of computer science and electrical engineering. These organizations have held this competition for the last four years in April during the ISPD. The problems addressed in these competitions all involve crucial technology currently used by industry and academia in the design of integrated circuits. The first two contests focused on placement, while the last two concerned global routing. Each year, leading research teams from around the world take up the challenge in hopes of devising solutions to some of the most troublesome problems currently encountered by industry.

Due to its outstanding second-place performance, the NTU team has found itself the target of aggressive recruiting by high-level executives from the world's major electronic design automation firms. It is worth mentioning that NTU and Dr. Yao's research team are the only institution and team to have won awards in both the ISPD placement and global router contests. This award follows up NTU's first and second place awards won at the ACM CADathlon in November 2007.

NTU College of Medicine's Dr. Che-ming Teng Continues to Head National Biotechnology and Pharmaceuticals Development Program

The 21st century has been called the century of the biotechnology industry and is expected to witness an improvement in human health and quality of life. Many developed countries have invested heavily in medical research and have successfully developed a range of innovative medications. In Taiwan, however, most drugs are generic medicines with expired patents that are produced domestically or simply imports from developed nations.

Dr. Che-ming Teng of the NTU College of Medicine's Department of Pharmacology

As Taiwan boasts many experts in advanced technologies and is home to numerous highly-successful research institutes and medical centers, it is an ideal location for the development of new drugs. Due to these strengths and the enormous growth expected in the biotechnology industry this century, Taiwan's National Science Council (NSC), in 2000, designated the biotechnology and pharmaceutical sector one of the key areas for promotion under the government's long-term national development scheme. In 2003, at the beginning of the second phase of this development program, the NSC selected Dr. Che-ming Teng of the NTU College of Medicine's Department of Pharmacology to lead the National Science and Technology Program for Biotechnology and Pharmaceuticals (NSTPBP) and charged him with the integration of domestic resources and research institutes for drug research and development. Following a successful four-year term, Dr. Teng was reappointed to his post for the third phase of the national development program, which runs from 2007 to 2010.

Dr. Teng and his team of group leaders have devised strategies to push forward the nation's drug research and development.

The NSTPBP operates through a sharing and collaboration system as shown in Fig. 1. The up-, mid-, and down-stream sections of the drug research and development chain are supported by the NSC, Ministry of Economic Affairs and Department of Health, respectively. In the upstream section, basic research is performed by universities, the National Health Research Institutes and Academia Sinica. In the midstream section, projects related to pre-clinical development are carried out by non-profit organizations and state-operated business units. In the downstream section, clinical trials and product commercialization are driven by industry. Dr. Teng and his team of group leaders have devised the following strategies to push forward the nation's drug research and development.

(1) Establishment of New Drug Discovery Capacity

The NSTPBP works to advance the R&D of Chinese herbal medicines, new chemical drugs and biotech medicines for the treatment of cancer, diabetes, cardiovascular diseases and neural diseases. As development of a new drug requires the efforts of experts from many disciplines, such as chemistry, pharmacy, pharmacology, toxicology and clinical medicine, the NSTPBP coordinates the efforts of researchers from Taiwan's academic and research institutes. The research teams set up various drug

discovery methodologies and technologies for bioassay systems for drug screening and search for new drug targets and mechanisms.

(2) Establishment of Drug R&D Infrastructure

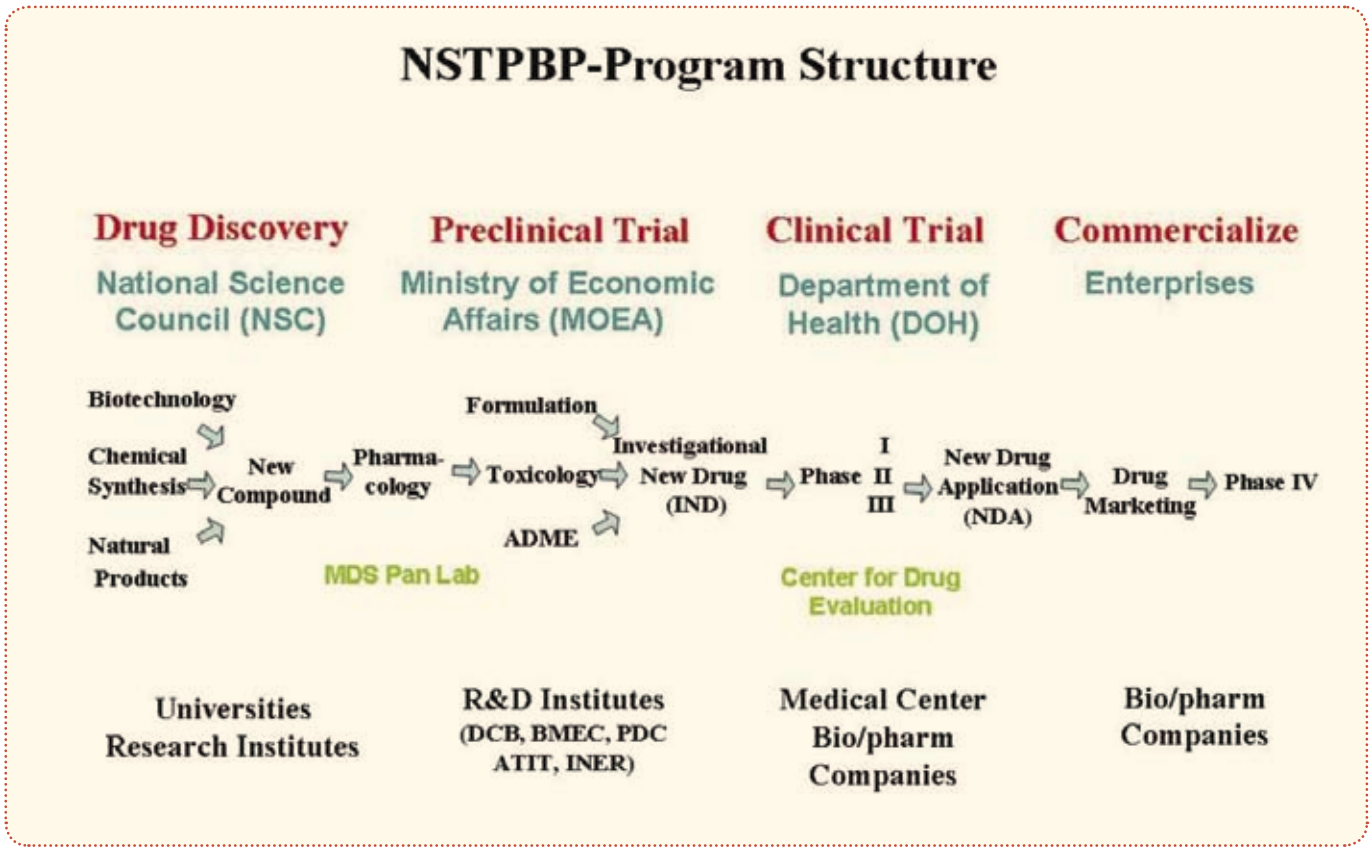
After the discovery of a new drug, the lead and candidate drugs must be subjected to pre-clinical experiments under Good Laboratory Practice guidelines. Therefore, the NSTPBP commissions this research to contract research organizations. Qualified firms have been evaluated and selected for the scale-up synthesis of medicines and various *in vitro* and *in vivo* assays in pharmacology, toxicology and pharmacokinetics. The program has also established core facilities that provide essential platforms for drug development, including a Current Good Manufacturing Practice (cGMP) pilot plant for protein drugs, an animal toxicology center and a cGMP pilot plant for botanical drug products.

(3) Establishment of Clinical Trial Monitoring System

When conducting clinical research, investigators must adhere to the ethical principles of the Declaration of Helsinki, meaning the rights, safety and well-being of human subjects take precedence over scientific and social benefits. Prior to every clinical trial, the Center for Drug Evaluation provides consultation to ensure conformance with Good Clinical Practice guidelines. Also, to improve quality, the NSTPBP has established a unique mechanism for the monitoring and inspection of clinical trials. Over the last two years, it has also emphasized translational medicine projects in order to promote bench-clinical cross-talk, enhance clinical value-oriented studies and facilitate the development of new therapies.

(4) Academic-Industry Bridging Project (AIBP)

In order to promote the transfer the project's upstream research achievements, the AIBP evaluates these achievements, conducts patent and market analysis, coordinates industrial bridging and seeks out international channels. It also provides a range of technical consultation services and physical technology transfer platforms. Through these new measures, the AIBP aims to accelerate the transfer of upstream research achievements and create small but sophisticated biotech and pharmaceutical R&D models in Taiwan.



Joint NTU-ITRI Team Develop Breakthrough Technology to Minimize Surgery for Joint Cartilage Repair

Recently, a research group at NTU Hospital made a medical breakthrough by developing a new cartilage repair implant procedure that utilizes a novel biphasic osteochondral composite in cartilage defect sites. This study was led by Dr. Ching-chuan Jiang, M.D., Ph.D., Chairman of the Department of Orthopaedic Surgery, National Taiwan University Hospital, in cooperation with the Biomedical Engineering Research Laboratories at Taiwan's Industrial Technology Research Institute. Exactech, an American company specialized in bone and joint restoration products, has acquired the rights and patents for this technology and plans to launch a cartilage repair procedure including a device and technique for the treatment and repair of cartilage in the knee joint. The biotech firm is scheduled to begin human clinical trials, under the guidance of the US Food and Drug Administration, to obtain pre-market approval for the technology in the United States.

The project's leader, Dr. Ching-chuan Jiang.

The following are excerpts from an interview with the project's leader, Dr. Ching-chuan Jiang.

First of all, tell us about the background of this research finding. What is a biphasic osteochondral composite?

A biphasic osteochondral composite, by definition, is a composite of an osteo phase and a chondral phase, which in plain language means this composite consists of a bone part and a cartilage part. Anatomically speaking, our joints are bones covered with cartilage. Usually arthritis happens because there is wear and tear in the cartilage structure. As early as the 18th century, Dr. John Hunter, a British surgeon, observed that articular (joint) cartilage "once destroyed, is not repaired" because of its avascular nature; that is, since there is no blood supply to the cartilage, there is a lack of repair cells in that region. As the cartilage continues to deteriorate, it will ultimately progress to arthritis.

The idea behind biphasic osteochondral composite is to mimic the components of our joints. The chondral region is made of biodegradable poly-lactide-co-glycolide (PLGA) and the osteo region is made of tricalcium phosphate (TCP). Our findings show that, by using low-density chondrocyte seeding in PLGA and utilizing TCP's high osteoconductivity without seeding any osteocytes, then press-fitting these composites into defective pig knee joints, smooth surface morphology is observed once saturation is complete. Moreover, our analysis of matrix production, cell distribution, cell viability, subchondral bone, chondral phase mineralization, osseous phase, tissue interphase and mechanical properties all demonstrate that the composite integrates well with the native tissue. This promising outcome in the animal study provides a potentially better option for cartilage defect treatment. For example, whenever there is a minor cartilage injury, this biphasic osteochondral composite can serve to fill the void created by the injury and repair the defect, thus preventing it from progressing into arthritis.

What are the current treatments for cartilage defects? And, how might this new composite be a better option?

Currently, there are two major approaches to treating

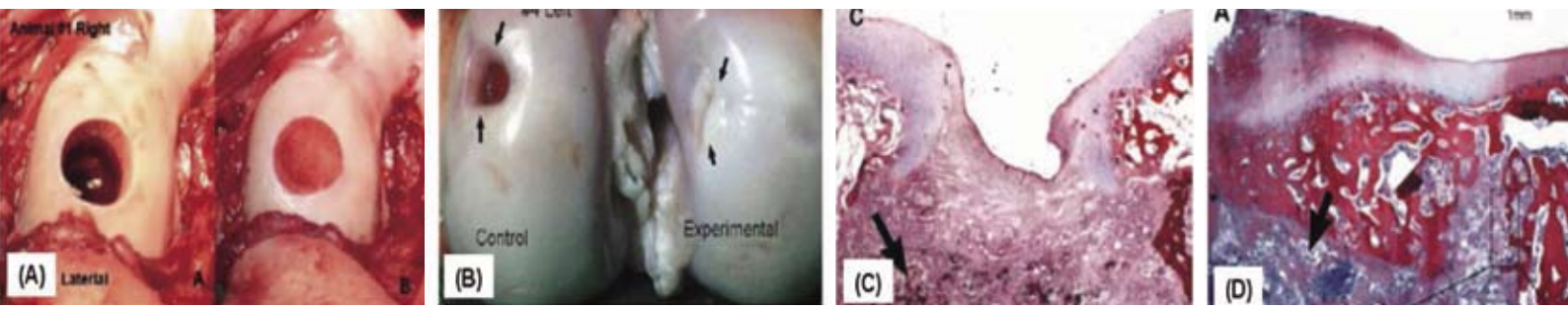
cartilage defects. One is called mosaicplasty, which involves harvesting cartilage from other parts of the same body that are less functional and replanting it into the defect site. The other is autologous chondrocyte implantation (ACI), developed by Genzyme, an American biotech company. This procedure first takes a piece of the patient's cartilage and uses an enzyme to extract chondrocytes, then the chondrocyte population is expanded in a tissue culture for three weeks and the cells are replanted back into the patient's injury site.

Both options are effective, yet each has disadvantages. The biggest advantage for mosaicplasty is that, using the patient's own tissue for repair, it can avoid body rejection; however, this can only be achieved at the expense of creating another lesion, and there is always the chance of infection, or other side effects, when there is a lesion.

The advantage of Genzyme's ACI is that the treatment is at the cellular level, re-laying a foundation by seeding cells and allowing cartilage to regrow. However, in completing the procedure, the patient must undergo two surgeries: first, to obtain a piece of cartilage from which to extract chondrocytes, and, second, to implant the expanded chondrocyte population back into the defect site. Surgery always comes with risks, and the older the patient is, the greater the risk becomes. Additionally, in order to perform ACI, hospitals must be equipped with laboratories that meet strict GLP [Good Laboratory Practice] and GTP [Good Tissue Practice] guidelines and regulations. Weighing the complexity and risks of the procedure, it's no wonder ACI isn't a popular treatment internationally and is available only in a few countries.

The biphasic osteochondral composite approach avoids these problems. First of all, since it is "osteochondral," the composite can go one step further and treat bone defects in addition to cartilage defects. Moreover, because the composite requires only low chondrocyte seeding density and no osteocyte, chondrocytes can be harvested at the time of surgery for seeding into the chondral phase of the composite, and the composite can then be planted into the defect site. Not only does this bypass all the stringent laboratory regulations, but the second procedure can also be avoided, reducing the surgerical risk. What's more, no intentional cartilage lesion is made, and the entire composite implant procedure can be done by arthroscopy, a minimally invasive procedure. Constructing and implanting a biphasic osteochondral composite is a straightforward procedure in the animal study, and we foresee that it will be similarly straightforward when applied to humans. We envision that every surgeon in the world can learn this simple technique and master it in a short period of time, so it will become a universal method and not just a regional one. We are very optimistic that once this biphasic osteochondral composite passes clinical trials and

Repairing osteochondral defect with chondrocyte-loaded biphasic composite (A). Six months after the procedure (B). Histological appearance of the control (C) and the experimental (D) sites.



becomes a product, it will be an effective and popular option for treating cartilage defects.

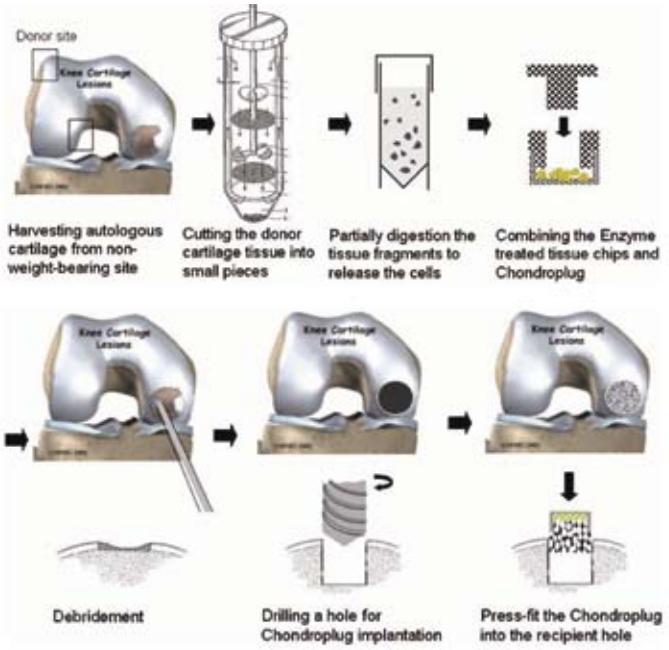
What makes your research team unique?

Our team's greatest edge is that we are an interdisciplinary group of scientists, including clinical physicians, molecular biologists, veterinarians and materials scientists. The clinicians initially identify problems in patients as well as with the available treatments, and propose possible improvements. Then, working with materials scientists and molecular biologists, they integrate the latest stem cell knowledge and tissue engineering technology, wave the magic wand and turn clinicians' fancies into reality by coming up with products that solve the problems. Veterinarians then take the product and perform preliminary animal studies before it is tried on humans. Hence, this biphasic osteochondral composite development and its breakthrough achievements are the result of a collective effort.

Who are the best candidates for this treatment?

Adolescents with osteochondritis dissecant, whose cartilage falls off. Also, sports injury patients and trauma patients would be ideal candidates for this treatment. Since their cartilage defects tend to be the result of one-time damage, repairing the cartilage wound in a timely manner could prevent it from progressing to arthritis. And, of course, elderly patients with osteonecrosis and/or signs of degenerative osteoarthritis are suitable candidates, as well. Since elderly patients require longer rehabilitation after surgeries, the minimal invasiveness of this new procedure could reduce the size of the surgical wound, and thus shorten recovery time.

Will this biphasic osteochondral composite treatment eventually replace current artificial joint treatments?



No. In fact, let me clarify one point first. Usually, when a patient needs total joint replacement, his or her cartilage defect must have already progressed to the most severe stage, or his or her arthritis condition has developed to degenerative arthritis and no other treatment is effective enough to ease the disabling pain. What this biphasic osteochondral composite promises is to serve as a preventive measure to stop or slow the defect progression before it is too late and the only treatment option left is total joint replacement.

This technology was developed entirely in Taiwan. What is the significance of this and what impact will it have on the future of the biotechnology industry in Taiwan?

Most of the orthopaedics treatments used in Taiwan today are imported techniques, so the development of this biphasic osteochondral composite in Taiwan shows that we have the resources, in terms of expertise, laboratories and government support, to develop novel biotechnology products of our own.

NTU Speech Website Shares Archived and Live NTU Speeches with Campus and World

NTU Speech has amassed a collection of more than five hundred videos including 35 series.

NTU Speech is a website that has been developed by the Center for Teaching and Learning Development's Division of Multimedia and E-Learning. Through the archival of important academic speeches, NTU Speech provides a rich environment for the university's students, faculty and staff. The website has amassed a collection of more than five hundred videos including 35 series, and has received more than twenty-one thousand visits since its establishment. Most speeches are even open to the domestic and international public. The website has become a valuable learning resource for all users and provides a great service to society. NTU Speech is located at http://speech.ntu.edu.tw. Here's a brief introduction to its three main functions and services.

Speech Announcements

NTU Speech makes use of the university's web announcement system to collect and announce the latest information regarding all speeches on campus. All academic units can post announcements to this system in order to share information about important speeches they are preparing to present. The site thereby serves as a portal through which users can learn about the speeches they are interested in attending.

Video-on-Demand

As part of its video archiving system, NTU Speech further enhances all videos with post-production and provides them through its Video-on-Demand (VOD) service. The division's multimedia production team has made great efforts to film and digitize videos and to create an introduction page providing speech and speaker information for each video. NTU Speech has collected a wide selection of videos of lecture series, professional seminars, conferences and workshops spanning all fields. Some significant collections include the Nobel Prize Laureates series, Entrepreneurs series and Outstanding Academic Scholars series. The VOD service allows users to check out whatever topics or speakers they are interested in and view the videos online at anytime, from anywhere.

Online Broadcasting

NTU Speech also provides an online broadcasting service similar to satellite news gathering services used by television stations. Users can log on to view speeches and important academic activities as they are taking place. By eliminating the limitations of space and distance, more and more people can enjoy speeches with NTU Speech.

NTU Speech is located at http://speech.ntu.edu.tw.

Center for Teacher Education Conducts Problem-based/Project-based Teaching and Learning Symposium in April

The Office of Academic Affairs' Center for Teacher Education conducted the 4th Annual Dialogue Between Educational Theory and Practice on NTU's main campus on April 25. This year's symposium was organized around the concept of problem-based/project-based teaching and learning-- an approach of increasing significance in middle school education--and was designed to provide teachers with an opportunity to present and share their teaching experiences.

The symposium's four main events were: 1) an exploration of problem-based learning-- leading scholars and experts on this approach were invited to present their insights; 2) demonstrations by outstanding teaching teams that have used the problem-based teaching and learning approach in schools were specifically invited; 3) the presentation of the NTU Super Lesson Plan Awards; and 4) a general discussion across disciplines in which scholars and experts, teachers and other attendees spoke broadly on problem-based learning and real issues encountered in teaching middle school students.

A wide range of innovative teaching approaches and learning strategies have emerged in the wake of the wave of education reforms in recent years. Among these, problem-based learning is attracting attention and is being tried in middle schools. This approach differs from traditional teaching methods based mainly on lecturing in that it aims to attract students to learn by tackling concrete, complex problems. In the course of applying creative problem-solving methods, such methods as discussion, conceptual differentiation, etc., are used to foster students' creative thinking, problem solving, and communication and expression.

The 4th Annual Dialogue Between Educational Theory and Practice centered on the concept of problem-based/project-based teaching and learning and took place at the Institute of Applied Mechanics' International Conference Hall on April 25.

This year, the symposium's organizers held the first competition for the NTU Super Lesson Plan Awards to increase participation in the symposium and provide a platform for teachers to exchange experiences. Following an open solicitation for outstanding and innovative teaching plans, the organizers received an enthusiastic response from both current and future teachers; of those submitting entries, 64% were middle and high school teachers, and 36% were students enrolled in education courses. A total of 29 teaching plans were subjected to stringent evaluations and eight awards were presented, including an Outstanding Award, First Place Award, Second Place Award and Honorable Mentions.

The success of this year's symposium was reflected, not just in the number of contest entries, but in the presence of over 150 guests, including faculty and students from every NTU department, instructors from teacher education organizations, school principals and directors, teachers and student practicum teachers. Moreover, reporters from eight media organizations attended the awards ceremony in order to conduct interviews and report on the awards.

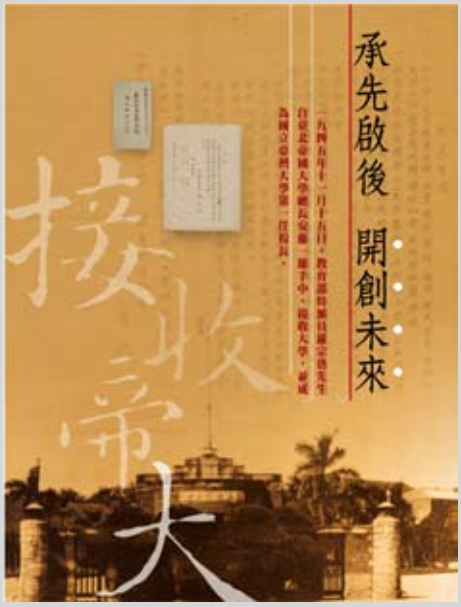
NTU Archive Room Preserves and Displays NTU's Rich Material History

NTU was founded as Taihoku Imperial University under the Japanese colonial government in 1928, and received its current name when it was reorganized by its first president, Tsong-lo Lo, under Taiwan's Republic of China government, on November 15, 1945. The NTU Archive Room, relocated to NTU's Shuiyuan Campus in August 2007, serves as a repository and exhibition hall for documents and artifacts accumulated over the course of the institution's 80-year history.

From 1945 to the present, NTU amassed a collection of approximately 1.4 million paper documents and 200,000 digital video files, which are stored in a warehouse on the Shuiyuan Campus. The Archive Room has begun to utilize digital technology and state-of-the-art techniques in its effort to present the rich diversity of its archived materials and imbue them with new meaning.

After moving to its new home, the newly-opened Archive Room organized a special exhibition commemorating NTU's 80th anniversary. Since then, it has enjoyed a steady stream of visitors curious about the university's fascinating history. Due to this enthusiastic response, the Archive Room began to open to the public every Monday through Saturday this past April.

The Archive Room's exhibition and archival personnel continue their efforts to enhance the quality of the room's exhibits by deepening their content and expanding the range of uses for the university's archived materials. The memories preserved in the university's material history relate the lives and thoughts of the great people who have passed through the gates of the NTU campus, and serve to tell the story of this complex and intriguing period of modern Taiwanese history.



NTU Hosts 2nd Annual Taiwan International Student Soccer Festival in May

The 2nd Taiwan International Student Soccer Festival took place at the NTU Soccer Field for three sunny days from May 2-4. The three-day event, organized by NTU Foreign Students' Association together with the Office of International Affairs and the NTU International Students Information Services, attracted 14 teams from 13 universities from around Taiwan. The participants were from more than 40 countries from all over the world. Held for the second time, the festival has already become an annual event. In 2007, it drew ten teams from eight different universities from northern Taiwan.

Qualifying rounds were played the first two days, with teams scoring a total of 35 goals on the first day. The National Pingtung University of Science and Technology team was the festival champion, while the team from National Taipei University of Technology took second place. The third-place team turned out to be none other than the host team – the NTU Foreign Students' Association team.

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