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CONTENTS

- 1 In Memory of Former NTHU President Liu Chung-laung
- 2 The Future of Medicine at NTHU
- 3 Researchers Discover New Gastric Cancer Biomarkers for Tailored Therapy
- 4 Providing a Refuge for Endangered Ferns
- 5 A New Interdisciplinary Music Program
- 6 Research Team Invents Microwave Coffee Roaster
- 7 NTHU Strikes Gold at the National Intercollegiate Athletic Games
- 8 Tsing Hua Effects 2020—Technology Art Festival

IN MEMORY OF FORMER NTHU PRESIDENT LIU CHUNG-LAUNG

Former NTHU president Liu Chung-laung

passed away on November 7, sending a wave of grief across the entire campus.

In 1998 Liu gave up his American citizenship and became the eleventh president of NTHU. Widely respected for his keen judgement and friendly leadership style, during his four-year tenure he enhanced Tsinghua's reputation and facilitated major corporate donations for the construction of several new buildings, including the TSMC Building and the Macronix Building.

Early in his tenure Liu proposed a collaborative arrangement among NTHU, National Chiao Tung University, National Central University, and National Yang-Ming University to form the University System of Taiwan (UST), a cooperative network for resource sharing and academic exchanges. He was also instrumental in the establishment of NTHU's Institute of Law for Science and Technology, Institute of Technology Management, Department of

Quantitative Finance, and College of Technology Management.

After stepping down from the post of president in 2002, Liu continued to teach in the Department of Computer Science, while maintaining an active interest in the school's ongoing development. In 2006 he joined NTHU's University Development Advisory Committee, and was planning to attend its meeting scheduled for the end of this year.

Liu's unassuming manner and friendly smile made him highly popular amongst the student body. In 2005 he began hosting "I Love to Talk and You Love to Laugh," a lively and thought-provoking weekly radio show.

Liu was also an early proponent and exemplar of interdisciplinary education and research. In fact, for Liu the traditional boundaries between various disciplines were convenient fictions, and one of his favorite adages was "a deep understanding of one field brings an understanding of all fields."

In accordance with Liu's wishes, no funeral services will be held. Instead, his family has set up a memorial website for leaving condolences and tributes at: <https://clliu19341025.wpcomstaging.com/>



THE FUTURE OF MEDICINE AT NTHU

NTHU's plan to add a department of medicine has generated lots of discussion in the medical community. In presenting the plan, Senior Vice President of academic affairs Chen Sinn-wen stated that the training of medical personnel is actually nothing new at NTHU, since over the years lots of practicing doctors have come to NTHU for graduate degrees relating to such areas as artificial intelligence (AI), big data, nanomedicine, rapid test kits, target drugs, and artificial organs.

Amongst the researchers at the lab of Prof. Cheng Chao-min (鄭兆珩) of the Institute of Biomedical Engineering are four doctors currently doing graduate study at NTHU, including a young physician licensed in both Western and Chinese medicine.

Prof. Cheng Chao-min (鄭兆珩) (center) of the Institute of Biomedical Engineering with two members of his research team: Wu Yu-feng (吳俞鋒) (left) of the Department of Plastic Surgery at National Taiwan University Hospital, Hsinchu Branch; and Chen Cheng-han (陳正翰) of the Emergency Department at Taipei Veterans General Hospital.

New weapons for fighting illness and disease

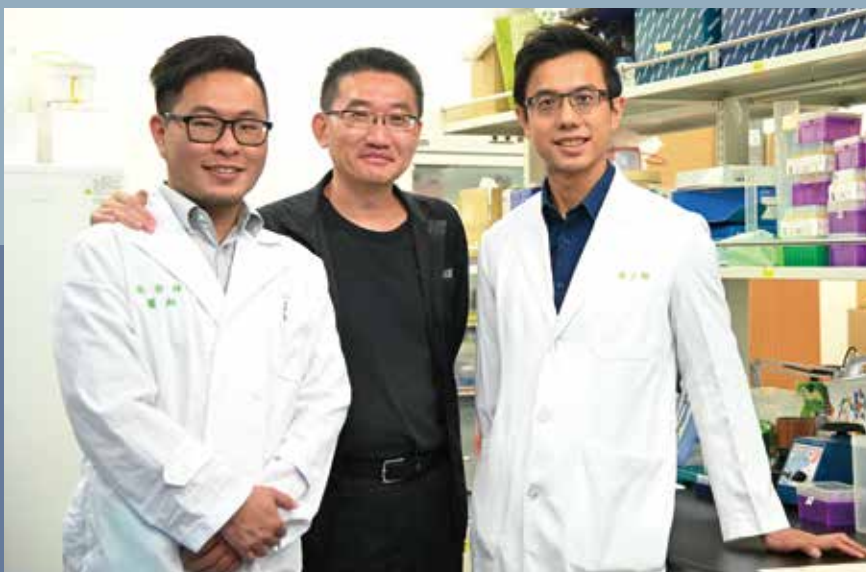
Specializing in nanomedicine and rapid testing procedures, Cheng has recently developed the world's first covid-19 rapid test kit, and he has previously developed rapid test kits for determining sperm vitality and bacterial infection. Over the years, his laboratory has trained and cooperated with more than 20 physicians.

Cheng said that in the treatment of intractable diseases, front-line doctors are comparable to seasoned soldiers who understand the enemy and how to fight, but sometimes lack suitable weapons; while researchers are like the engineers who develop

weapons, and the lab is like a big armory stocked with all sorts of weapons. He also emphasizes the importance of interdisciplinary research, especially in the medical field.

Interdisciplinary research

Amongst Cheng's research students is Dr. Hsu Min-yen (許閔彥) of the Ophthalmology Department at the Chung Shan Medical University Hospital. After graduating from the Department of Medicine at National Taiwan University, he did his residency in clinical medicine at the Taipei Veterans General Hospital, and in 2016 he completed a Ph.D. at NTHU's Institute of NanoEngineering and



MicroSystems (iNEMS). Earlier this year he became the first clinical physician to receive the Ministry of Science and Technology's Columbus Award.

Hsu said that in order to detect ocular lesions, it is necessary to extract some fluid from the anterior chamber of the patient's eyes for analysis. This presents a problem, however, since removing as little as 0.2 cc can cause the eye to collapse. Thus in his research at NTHU he is using nano-engineering to develop a way to measure this fluid.

Hsu said that what attracted him to Tsinghua is its world-class faculty, including Prof. Cheng, who did his postdoctoral research at Harvard University, and Associate Prof. Chen Chih-chen (陳致真) of the Department of Power Mechanical Engineering, an associate of

the highly rated Massachusetts General Hospital in the USA. In his acceptance speech for the Columbus Award, Hsu said that if not for NTHU, he could have never received the Columbus Award.

With support provided by the Chung Shan Medical University and the Columbus Award, Hsu has set up his own research lab and has begun to mentor research students. He is also a firm believer in the interdisciplinary approach to medical research.

Enhanced procedure for treating chronic infections

Another member of Cheng's laboratory is Dr. Wu Yu-feng (吳俞鋒) of the Department of Plastic Surgery at National Taiwan University Hospital, Hsinchu Branch. When Wu graduated from

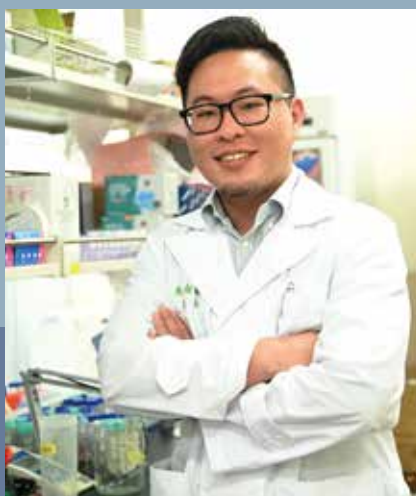
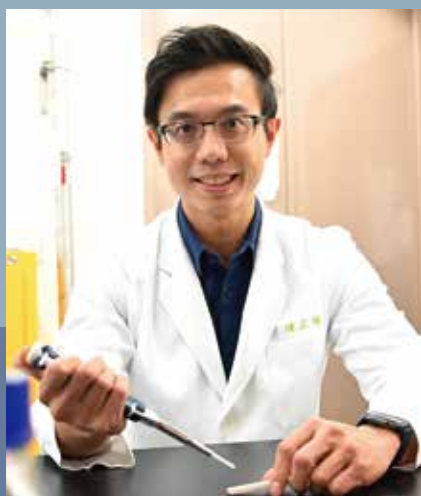
the Department of Medicine of National Taiwan University nine years ago, keen on upgrading his ability to deal with challenging trauma reconstruction cases, he decided to return to NTHU and pursue a Ph.D. at the Institute of Biomedical Engineering.

Wu displayed a photo of a patient's heel affected by chronic osteonecrosis and said that in his clinical practice he sees quite a few chronic wounds affected by bacterial infections and biofilms, for which surgery is often ineffective. Thus he is currently working with Dr. Cheng Nai-chen (鄭乃禎) of the Department of Plastic Surgery at National Taiwan University Hospital to develop a procedure that can detect a biofilm on a chronic wound in just two minutes, and determine whether the biofilm has made the wound impervious to medication.

Wu's quick screening procedure will increase the efficiency of surgeons and a number of hospitals have already expressed interest in using it.

A stitch in time saves nine

Another member of Cheng's research team is Dr. Chen Cheng-han (陳正翰) of the Emergency Department at Taipei Veterans General Hospital. Chen said that the exigencies of the emergency



- a. Chen Cheng-han (陳正翰) is currently developing a rapid procedure for detecting bacteria in urine and blood samples.
- b. Dr. Wu Yu-feng (吳俞鋒) is conducting research at NTHU relating to the development of a biofilm rapid testing procedure.

room make it necessary to perform a quick examination and triage, so as to begin treatment as soon as possible. With this in mind, he is currently developing a rapid procedure for detecting bacteria in urine and blood samples.

Dr. Chen, who graduated from Kaohsiung Medical University nine years ago, said that the methods used in medical treatment tend to advance quickly, and the need to keep abreast of the latest developments in clinical medicine led him to NTHU, where his contact with various teachers and students with a background in engineering has inspired him in his endeavor to develop better methods of dealing with challenging clinical issues.

pills placed in the brain easily get displaced. Thus he has developed a nano-hydrogel which stays in place while slowly doing its job. Animal experiments have confirmed that it has a good effect, and he is currently preparing an article for publication in an international journal.



- a. Lin Hsin-yao (林新曜), a neurosurgeon at Mackay Memorial Hospital in Taipei, is conducting research at NTHU on a slow-acting nano-hydrogel for treating brain tumors.
- b. Hsu Min-yen (許閔彥) of the Ophthalmology Department at the Chung Shan Medical University Hospital at work in the lab.

Major advance in chemotherapy

Dr. Lin Hsin-yao (林新曜), a neurosurgeon at Mackay Memorial Hospital in Taipei, is currently studying for a Ph.D. at Institute of NanoEngineering and MicroSystems under the guidance of Prof. Wan Dehui (萬德輝). In the course of treating patients with brain tumors, due to the need to retain as many nerves as possible, brain tumors often cannot be completely removed, so that further drug treatment is typically required after surgery, but the hard

Dr. Lin laments the lack of communication between clinical physicians and biomedical researchers in Taiwan, such that researchers are often unaware of what physicians need, and physicians are often unaware of the treatments being developed by researchers. A graduate of Yangming Medical College, as soon as he became an attending physician he decided to undertake interdisciplinary research at NTHU to help address this shortcoming.

AI in medical care

Dr. Hung Chen-ying (洪振羣) is the director of the Department of Cardiology at the Veterans General Hospital, Hsinchu Branch, and a student of NTHU's international doctoral program (ipHD). Having previously used statistical methods to analyze health insurance data, in 2016, under the guidance of Prof. Jeremy Lee (李祈均) of the Department of Electrical Engineering, Hung began using AI, to enhance his analysis. The AI module he has developed can

accurately predict the complications of gastrointestinal bleeding caused by the use of anticoagulant drugs in stroke patients.

Hung said that it's not easy to go from traditional medicine to AI, but building AI analysis modules into hospital and health insurance databases would provide an early warning and help more patients.

A new treatment for osteoporosis

Dr. Chen Chun-chieh (陳俊傑) of the Orthopedics Department at the Linkou Chang Gung Memorial Hospital completed a doctorate in chemical engineering at NTHU in February, 2020. After graduating from Chinese Medical University, he spent two years in the United States studying biopolymer materials. After returning to Taiwan he joined a research team led by Prof. Sung Hsing-wen (宋信文) who specializes in drug release and medical gases.

In his clinical practice Chen treated many patients with osteoporosis due to aging, which can be controlled by using drug treatment, but can't be reversed. However, as a part of Sung's research team, Chen helped to develop a method



Dr. Hung Chen-ying (洪振瀛), director of the Department of Cardiology at the Veterans General Hospital, Hsinchu Branch, receiving the Outstanding Paper Award at the 2018 Engineering in Medicine and Biology conference organized by the IEEE.

for stimulating bone growth by overcoming the short half-life of nitric oxide. Their research has been published in the top international journal *Advanced Materials*. They have also found that using nitric oxide can reduce the dose of radiotherapy in the treatment of soft tissue tumors, and increases the efficacy of the treatment.

The future of medicine

Senior Vice President Chen Sinn-wen said that NTHU already has a wealth of experience in training physicians in such fields as biomedicine, chemical engineering, and computer science, and that the next step is to recruit talented individuals with backgrounds in science and engineering for rigorous medical training in an interdisciplinary environment.

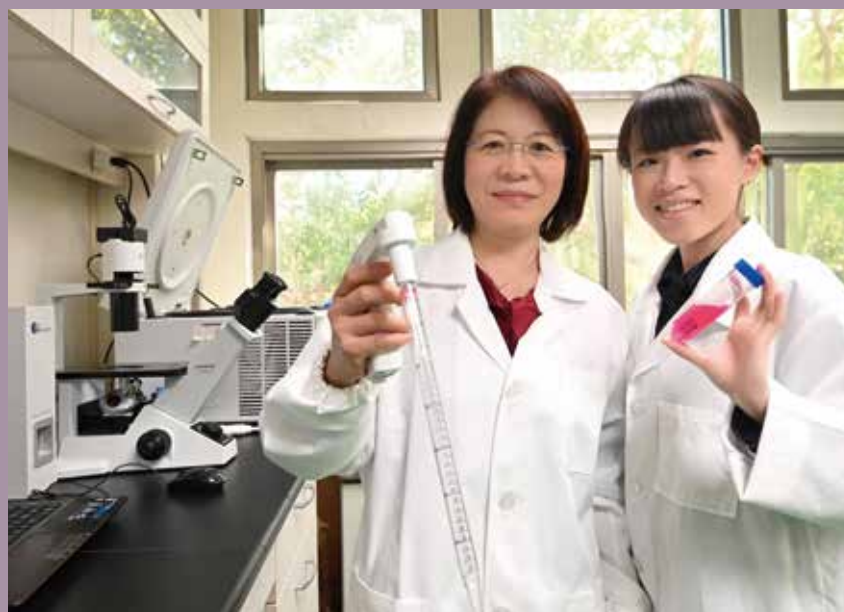
Chen said that the University of Illinois at Urbana-Champaign recently established a medical

school, the charter of which emphasizes the integration of engineering and advanced technology is going to play an increasingly important role in providing patients with more humane medical care, adding that this is also one of the guiding principles of NTHU's future post-baccalaureate program in medicine, the emphasis of which will be on blazing an innovative path for the future of medicine.

The Ministry of Education has already approved the Smart Biomedicine and Precision Medicine programs as post-baccalaureate programs in medicine, both of which will start recruiting students in 2021. On a related note, the Health Policy and Management master's program of the College of Technology Management will begin accepting applications in December.

RESEARCHERS DISCOVER NEW GASTRIC CANCER BIOMARKERS FOR TAILORED THERAPY

A research team led by Professor Wang Wen-ching (王雯靜) of the Institute of Molecular and Cellular Biology, National Tsing Hua University (NTHU) has exploited the power of big data to identify two key biomarkers contributing to the proliferation and metastasis of gastric (stomach) cancer. Using The US Food and Drug Administration (FDA)-approved drugs, the team conducted targeted therapy which can effectively eliminate tumor growth and inhibit metastasis, paving the way for a new tailored therapy. Their research has been published in the newest issue of *Proceedings of the National Academy of Sciences of the United States*.



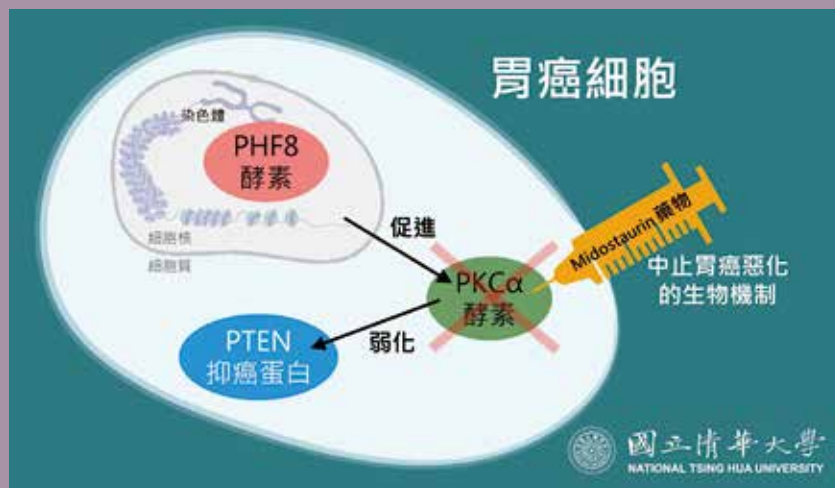
Prof. Wang Wen-ching (王雯靜) (left) of the Institute of Molecular and Cellular Biology and Dr. Tseng Linlu (曾琳蘆) researching a new treatment for gastric cancer.

Finding new ways to treat gastric cancer

Stomach cancer is the fifth most common cancer worldwide, and has the second highest mortality

rate because of its grueling and difficult treatment for many patients. Wang said that it often happens that by the time someone is diagnosed, cancer cells have already metastasized.

Wang said that there is, thus far, only one target drug (Her 2 therapy) that can treat gastric cancer, and it is only suitable for less than 20% of patients worldwide. In Taiwan, this number drops to 8%. Wang's team has been working on unraveling the mechanism underlying the spread of cancer cells and finding new biomarkers, with a goal





of developing a new tailored therapy.

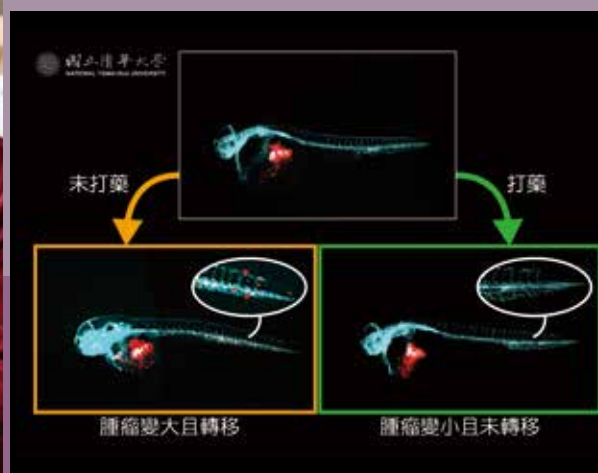
Putting the brakes on stomach cancer

Wang explained that the major reason for the spread of gastric cancer cells is the ineffectiveness of the protein phosphatase and tensin homolog (PTEN), the tumor suppressor protein which acts like a brake. When the brake fails, cancer cells will proliferate, expand, and grow into dangerous metastatic tumors. The team's first task was to determine the basis of this "brake failure."

The research team collected information from over 300 cases of gastric cancer and used big data to derive the biological pathway that lead to cancer progression from more than 30,000 potential

genes. They uncovered that the two enzymes PHF8 and PKC α play a key role in the enigma. The nuclear enzyme PHF8 is prevalent in ~40% of gastric cancer tissue and causes PKC α to surge, triggering the loss of PTEN, like "a brake failure".

Fortunately, PKC α activity can be inhibited by the drug midostaurin, an anti-cancer agent for the treatment of blood cancer approved by the US Food and Drug Administration three years ago. The team used zebrafish and mice models to provide the proof-of-evidence that midostaurin treatment can shrink tumors and curb further spread of the cancer.



PROVIDING A REFUGE FOR ENDANGERED FERNS

NTHU now has a dedicated fern garden. Established under the direction of Professor Li Chia-wei (李家維) of the Department of Life Sciences, the Fern Garden hosts nearly 100 rare fern species, including *Pteris wulaiensis* and *Adiantum capillus-junonis* all of which were transplanted from the Cecelia Koo Botanic Conservation Center in Pingdong County. In addition to supporting teaching and research in plant ecology, the Fern Garden will also help in preserving endangered fern species.

Located next to the Main Library, behind the replica of Rodin's statue *The Thinker*, the Fern Garden is protected by a glass wall allowing a full view of the Garden from the adjacent footpath.

Li had his student Chou Chiao-chi(周巧其), a dual major in biology and art, set up a fog machine to provide the ferns with extra moisture, creating a dreamy

scene reminiscent of a primeval forest, especially attractive at night.

President Hocheng Hong said that in recent years NTHU has been making a concerted effort to implement the sustainable development goals of the United Nations, adding that, even though ferns are not as flashy as flowering plants and may not have the economic value of seed plants, they are still important indicators of ecological vitality and environmental sustainability. Moreover, the sight of such a huge variety of ferns thriving in a relatively small space is a big relief for eyes wearied by the havoc brought on by the covid-19 pandemic.



Professor Li Chia-wei (李家維) of the Department of Life Sciences has recently established the Fern Garden next to the Main Library.

Li explained that ferns are flowerless and seedless, so they reproduce by producing spores. They were once one of the most important plant groups in the earth's terrestrial ecosystem, around the time of the dinosaurs, but now they live humbly in the shadows of big trees, and many of them are threatened with extinction.



- a. Scanning the QR code outside the garden brings up information on a variety of rare ferns.
- b. The Fern Garden is also home to *Asplenium nidus* (bird's nest fern), native to southeast Asia.

Li said that about 12,000 fern species have been discovered worldwide, including about 400 species in North America, about 700 species in Japan, and more than 820 species in Taiwan, making this 36,000 square kilometer island a veritable paradise for ferns. However, about 30% of the fern species on the island are threatened with extinction, including several critically endangered species endemic to Taiwan.

In determining which species would be best suited for the Fern Garden, Li was assisted by Chen Chun-ming (陳俊銘) of the Cecelia Koo Botanic Conservation Center. Chen shipped the ferns from Pingdong to NTHU in two batches, one in October and one in November, both inside a trailer which maintains a fixed temperature. About 60 species have already arrived, and another 40 species are on the way. Li explained that most of the

ferns in the Fern Garden are native to Taiwan, including *Pteris wulaiensis*, *Pteris angustipinna*, *Adiantum capillus-junonis*, and *Adiantum meishanianum*. He said that *Pteris wulaiensis* is found in small clusters in which less than 50 members reach reproductive maturity. *Adiantum capillus-junonis* grows in Nantou County and the area bisected by the Southern Cross-island Highway, built and maintained with large amounts of sprayed concrete, the



At the opening ceremony (left to right): assistant vice president and chief of staff Lin Yi-min; dean of academic affairs Lyu Ping-chiang; Li; Hocheng; eMemory Technology board member Cheng Tingyu (鄭亭玉); Cecelia Koo Botanic Conservation Center deputy CEO Tsai Li-wen (蔡立文); and Taiwan Cement public relations director Ye Yujun (葉毓君).



use of which has reduced its natural habitat.

Chen used stipules to cultivate more than 100 critically endangered *Angiopteris itoi*, one of which has been planted in the Fern Garden. In addition to fern species native to Taiwan, the Fern Garden also hosts a number of rare imported species, such as *Calciophlopteris alleniae*.

Li decide to locate the Fern Garden in a busy part of campus so as to raise awareness of the importance of biodiversity and habitat conservation. Moreover, the mature

pine trees dotting the site provide an ideal mix of shade and light, making it suitable for a wide range of fern species.

Li had glass artist Chang Ching-yao (張清耀) engrave on the surrounding glass wall images of how fern leaves, sporangia, and spores look under a microscope, making it both informative and attractive.

In addition to the Cecelia Koo Botanic Conservation Center, the Fern Garden received generous assistance from the Ministry of

Science and Technology as well as private donors. Funds for the ongoing maintenance of the Fern Garden will be provided by Charles Hsu (徐清祥), founder and chairman of eMemory Technology.

As part of the Fern Garden's educational mission, guided tours will be held. The tours are being organized by Sun Tzuyun (孫梓云), a sophomore of the Department of Life Sciences also a member of the Youth Council at the National Palace Museum.



- a. President Hocheng said that the Fern Garden has the highest concentration of ferns in all Taiwan.
- b. President Hocheng (left) using a magnifying glass to examine fern spores.
- c. Attaching sun-loving ferns to a tree.
- d. Engraved on the surrounding glass wall are images of how fern leaves, sporangia, and spores look under a microscope.

A NEW INTERDISCIPLINARY MUSIC PROGRAM

Some children are gifted with both academic prowess and musical talent, but by the time they get to high school they usually have to choose between one or the other. Such a difficult choice may no longer be necessary, for next year NTHU's College of Arts is preparing to launch "Music Plus," an interdisciplinary program providing talented students with an opportunity to major in music while doing a second major in such areas as music therapy, artificial intelligence (AI) composition, and music technology.

Breaking new ground

Music Department Chair Chang Fang-yu (張芳宇) said that next year the Department is planning to admit 34 new students according to the



standard examination procedures consisting of academic subjects and musical ability. In addition, the Department plans to admit five students to the Music Plus group using an individual application procedure including test results in Chinese, English, and mathematics, as well as an audition and interview.

Chang said that those admitted

to the Music Plus program will be required to have a double specialization, one of which is music, and the second one can be chosen from a wide variety of fields, including medicine, computer science, electrical

engineering, materials science, management, and preschool education. Both specializations will be specified on their diplomas.

Shifting priorities

Chang said that lots of parents sign their children up for music lessons, but once they reach high-school age they begin to encourage them to focus more on their academic studies, in the belief that music offers little in the way of a good career. She also pointed out that most music programs in Taiwan emphasize performance, but most of their graduates have to settle for a career in music education.

Chang also notes that NTHU already has a lot of musical



- a. The College of Arts is currently preparing to launch the Music Plus interdisciplinary program.
b. Chao Chi-chun (趙繼群)(right) and Li Yuerong (李悅榮) working on a joint composition.

talent—three Tsinghua students won first prizes in the non-music major section of this year's National Student Music Competition—but after starting university, their musical ambitions soon take a back seat to their academic studies.

Double major to the rescue

Chao Chi-chun (趙繼群), a senior in the Music Department, said that the addition of the Music Plus program will surely be a big help for students grappling with the dilemma of choosing between music and a more conventional career, as he knows from his own experience. Chao began taking violin lessons while in the first grade, but when he entered high school, much to his chagrin, his parents began to pressure him to give up violin and focus on preparing for the university entrance exam. After a good deal of negotiation, they arrive at a compromise, whereby Chao would do a double major in music and chemical engineering.

In addition to playing the violin, Chao also composes music and has done extensive study of vocal music; during school vacations he plays with an ensemble which performs at funeral parlors. He has also composed an orchestral piece that combines the mathematical principles of Pascal's triangle



Music Department director Chang Fang-yu (張芳宇) encourages her students to study an additional field.

and the eight-part vocal music of Taiwan's Bunun aboriginal tribe.

While backpacking overseas, whenever he told people he met that he was doing a double major in music and chemical engineering, he was routinely rewarded with stares of disbelief. But for Chao, "Knowledge is fluid and not limited to a particular field; doing a double major is like doubling your field of vision."

The soundtrack of the latest Star Wars sequel was composed with the assistance of AI, and this is an area in which Chao sees lots of potential. In Chao's estimation, few of the musicians currently using AI have a solid background in classical music, resulting in a sound which is awkward and rigid. Thus he is planning to develop a form of AI music which has more emotional appeal.

Music plus plus

The Tsinghua College undergraduate program accepts students specializing in music, art, and athletics. Tsinghua College

senior Li Yuerong specializes in music, and has two sub specializations, one in economics and one in foreign languages. She began taking violin lessons while still in elementary school, but when it came time to apply for university both she and her parents were concerned that majoring in music might not be a sensible career choice. Thus she decided to study music at NTHU while also studying more practical fields.

During high school Li spent all of her spare time practicing the violin, and her interdisciplinary studies at NTHU have kept her equally busy. She expects that the Music Plus program will make things significantly easier for students keen on studying music along with an additional field.

After graduation Li is planning to work in art administration and management. Despite the inherent challenge of studying both music and an additional field, she still encourages incoming students with a background in music to find a way to make music a part of their long-term career strategy.

RESEARCH TEAM INVENTS MICROWAVE COFFEE ROASTER

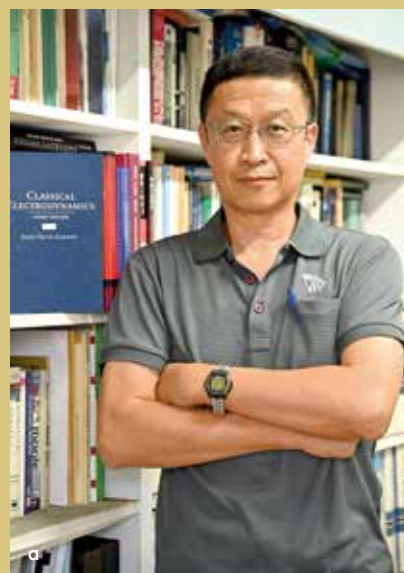
A research team led by Prof. Chang Tsun-hsu (張存續) of the Department of Physics has recently invented the world's first coaxial rotary microwave roaster. Chang's device can roast coffee beans in 6 to 8 minutes, compared to 30 to 40 minutes for the gas-powered roasters now in use, thereby reducing energy consumption by one third. The results are so good that even average coffee beans come out with the taste of gourmet coffee, Chang said with a smile.

Chang said their roaster is essentially a combination of the rotary joints used in radar technology and the microwave reaction chamber used by the

Chant Oil Company for producing microwave biodiesel.

Lightweight and customizable, their roaster is also well suited for drying other types of beans, as well as fruits and vegetables, and has already been patented in the U.S. and a number of Asian countries.

As for the secret of making coffee beans more fragrant, Chang said that the key is even heating and complete dehydration. He explained that conventional gas roasters often burn the beans on the outside, without getting the center sufficiently hot. By contrast, his roaster heats the beans quickly and evenly by using synchronized rotation and a specially designed



electromagnetic field that couples the electromagnetic waves as they penetrate the beans; the result is complete dehydration and a saccharification effect known as the Maillard reaction which makes it possible to precisely control the degree of roasting, thereby accenting the bean's unique flavor without increasing bitterness.

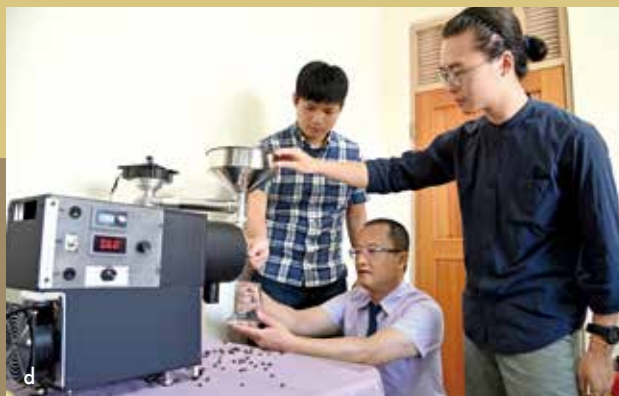
Chang's research was conducted in cooperation with the Chant Oil Company and was supported by a grant from the Ministry of Science



a. Chang's research team has invented the world's first microwave roaster.

b. The research team (left to right): Chiu Poyen (邱柏諺), Chao Hsienwen (趙賢文), Chang Tsun-hsu (張存續), and Kuo Huanchun (郭煥均).

b



c. The research team demonstrating their microwave roaster.
d. The microwave roaster saves both time and energy.

and Technology. The initial purpose of the project was to find a way to use microwaves to accelerate the biodiesel reaction, and although they succeeded in increasing the reaction rate by six times, this was much less of an improvement than what they were hoping for. Afterwards, they began to look into other possible applications for their invention, and eventually discovered it is highly suited for roasting coffee beans.

Team member Chao Hsienwen (趙賢文), also an assistant researcher at the Ministry of Science and Technology, said that the two main advantages of their invention are its speed, allowing users to quickly test the flavor, and its light weight, making it suitable for both small and medium-sized coffee roasters; what's more, their roasting technology can be adapted for use in mass production.

Eager to test out the commercial viability of their invention, last year team members Chiu Poyen (邱柏諺) and Kuo Huanchun (郭煥均)

set up a coffee roasting company. Both are undergraduates with dual majors: Chiu is a student of the College of Life Science with a sub specialization in chemistry, and Kuo is a student of the College of Science majoring in physics with a sub specialization in power mechanical engineering.

Coffee connoisseurs Chiu and Kuo became acquainted during their freshman year while participating in a student club, and shortly afterwards they set up a coffee stand. They thanked Prof. Chang for his assistance in establishing their coffee roasting company.

Kuo said that his purpose in joining the dual specialty at NTHU was to combine his love of physics with other fields, and that the team's coffee roaster is a good example of the integration of physics and mechanics.

Chiu said that many chemical changes occur during the roasting process, affecting the color, smell,

moisture, and size of the coffee beans, all of which affect their flavor, adding his background in chemistry gave him a deeper understanding of how to roast coffee beans in a way that enhances their aroma.

Chiu also said that the roasting process is like an experiment, explaining that it's necessary to repeatedly adjust the temperature and roasting time and observe how it affects the flavor, eventually arriving at a taste which is full-bodied and distinct. His roasting company already has a number of coffee shops amongst its regular clientele, and in the future they plan to begin selling their microwave roasting machines to coffee aficionados who enjoy roasting their beans at home.

NTHU STRIKES GOLD AT THE NATIONAL INTERCOLLEGIATE ATHLETIC GAMES

Tsinghua's athletes performed brilliantly in this year's National Intercollegiate Athletic Games, winning 20 gold medals, 14 silver and 18 bronze medals, setting a new record for the Games and raising NTHU's overall ranking to sixth place amongst the 147 participating colleges and universities. On December 10th NTHU's outstanding athletes were lauded at a special event held at the Tsinghua Hall of Fame. During the event Alumni Association president Tsai Jinbu (蔡進步) presented the award-winning athletes and their coaches with cash prizes.

The music for the event was provided by the clinking of the medals—as many as six—hanging

from the athletes' necks.

President Hocheng said that the large number of shining medals visible at the event bears witness to all the hard work Tsinghua's athletes have put into their training, thereby strengthening the school's traditional emphasis on athletics and self-discipline.

Hocheng also said that he hopes to someday see some of the school's star athletes inducted into the Tsinghua Hall of Fame, which would provide additional inspiration to the school's future athletes, adding with a smile, "In 2020 we won 20 gold medals, and in 2060 we shall win 60!"

In his speech at the awards event Tsai Jinbu said that he felt honored to be have so many outstanding



athletes gathered in place, adding that he may not be a very good athlete himself, but he is a good cheerleader. Once during the Meizhu Tournament, Tsai was seated next to Hocheng and cheering at the top of his lungs, prompting Hocheng to suggest that he might want to join the Cheerleading Squad.

In reply, Tsai promised to advocate for the continuing support of athletics by the Alumni Association, asserting, "For those of us who aren't great athletes, this is the least we can do."

The 2020 National Intercollegiate Athletic Games were originally scheduled to start on May 2 at National Kaohsiung University, but were postponed to October 31



- a. NTHU president Hocheng Hong (left) presenting Alumni Association president Tsai Jinbu (蔡進步) with an autographed basketball.
- b. On December 10th NTHU's outstanding athletes in this year's National Intercollegiate Athletic Games were lauded at a special event held at the Tsinghua Hall of Fame.

due to the pandemic. During the competition, Tsinghua's athletes came through with flying colors.

Record-breaking performance

Led by coaches Chou Yichen (周宜辰) and Chang Youhua (張祐華), the Track and Field team won 8 gold medals, 4 silver medals, and 6 bronze medals. The women's team won the first place trophy and the men's team won the second place trophy. Amongst the team's 8 gold medals were one in the men's/ women's 100-meter dash, one in the women's 400-meter hurdles, one in the women's 400-meter relay, and one in the men's shot put.

Kuo Bochen (郭柏宸), a junior in the Department of Electrical Engineering, took first place in the men's javelin and shot put competitions, while setting a new record in the shot put competition. Kuo said that he spent almost all his spare time on training, and that he really enjoys it.

Kuo said that even he was surprised by his record-setting performance, and that he is grateful to his teammates, Chou, and Tsai for all their encouragement.

The Swimming Team won 5 gold medals, 7 silver medals, and 8 bronze medals. Team member Wang Hao, a senior in the Department of Sports Science, won gold medals in the 100-meter



freestyle, the 200-meter freestyle, and the 200-meter freestyle relay. He said that he was impressed with the entire team's performance.

A new team at the top

The women's Table Tennis team participated in the women's open for the first time this year, pulling off a dramatic comeback in the finals, and ultimately winning the gold medal, in the process ending the 11-year winning streak of the team from the Chinese Culture University.

Team coach Wu Techeng (吳德成) said that this year Tsinghua's sports teams "have done the impossible!" attributing their success to two years of intensive training coupled with enthusiastic encouragement.

A new first in archery

Led by Coach Ni Tachih (倪大智), who also heads the national team, the Tsinghua Archery Team beat Chung Cheng University by 6-2 in the women's recurve bow competition to win the gold medal—a new first for Tsinghua.

Department of Sports Science M.A. student and team captain



c. NTHU senior vice president Tai Nyan-hwa presenting members of the Tennis Team with duffle bags embossed with the NTHU Logo.

d. The Badminton Team won 1 gold medal, 2 silver medals, and 1 bronze medal.

Lin Shichia (林詩嘉) attributed the team's success to the strong coordination and team spirit amongst all its members.

Lin thanked Coach Ni for his guidance. She said that Ni rushed back to Hsinchu from Kaohsiung every week to lead the training sessions, and that his guidance was indispensable. She also extended a hearty thanks to Tsai Jinbu for all his support and encouragement.

In addition, under the guidance of Hsu Renhao (許仁豪), the Badminton Team won 1 gold medal, 2 silver medals, and 1 bronze medal. Under the guidance of Cheng Weiren (鄭為仁), the men's Tennis Team won a gold medal in this year's team competition, for the third time in as many years. Finally, the Boxing Team won 2 gold medals and 2 bronze medals, and the men's Kickboxing Team won 1 gold medal.

TSING HUA EFFECTS 2020—TECHNOLOGY ART FESTIVAL

The Tsing Hua Effects 2020—Technology Art Festival kicked off on November

5. This year's festival features 48 works of art provided by NTHU's Research Center for Technology and Art. Combining such elements as electricity, magnetism, light, water, vision, sound, mechanics, and chemistry, each item in this diverse lineup of educational artwork stimulates the curiosity of young and old alike.

College of Arts dean Hsu Su-chu (許素朱) said that in recent years NTHU has been conducting various types of educational outreach programs in the rural areas of Hsinchu County, including an innovative pilot program in

science education at the Shakeng Elementary School.

The theme of Tsing Hua Effects 2020 is "STEM with A," i.e., STEM (science, technology, engineering, mathematics) plus art, or STEAM. The exhibition lasts for 3 weeks and concluded on November 22.

The exhibition was officially opened by President Hocheng and other attendees by pressing the button on the entry Dancing Water Vortex, setting in motion three whirlpools of water dancing inside transparent circular tubes.

President Hocheng said that the purpose of the Festival is to create a synergistic effect by combining art and science, thereby breathing

new life into higher education at NTHU and beyond.

Amongst the special guests at the opening event was Lee Yu-chuan, deputy director of the Department of Teacher Training and Art Education at the Ministry of Education. She said that combining technology and art increases students' competitiveness while also meeting human needs, adding that she is pleased to see that NTHU has extended the scope of its teacher training to primary and secondary schools, and that doing so has been a boon for the nation's ongoing efforts to promote multiple areas of expertise amongst students.

On the first floor of the busy Main Library (Macronix Building) can be seen Word Woods, a piece of interactive art consisting of a large white panel with black lines of conductive ink which make strange sounds when two are touched at the same time.

In the quiet study area of the Library is Wonderland, consisting of a set of large bottles filled with a transparent liquid which turns purple-red whenever somebody approaches it. The liquid inside the bottles is a toluene solution, which changes color due to an ultraviolet light triggered by a motion sensor.



The exhibition was officially opened when the entry Dancing Water Vortex was set in motion by (left to right) Deputy Director Lee Yu-chuan (李毓娟), NTHU president Hocheng Hong, Dean Hsu Su-chu (許素朱), and Alumni Association president Tsai Jinbu (蔡進步).



- a. Wonderland consists of a set of large bottles filled with a transparent toluene solution which turns purple-red whenever somebody approaches it.
- b. The first prize went to Lin Mengfeng (林孟峰) for his entry Colored Rubik's Cube, which demonstrates basic optical principles by exhibiting various colors when viewed from different angles.
- c. Young visitor playing with a piece of interactive art titled Happiness Is a Two-way Circuit.
- d. When two lines are touched at the same time Word Woods makes strange sounds.
- e. Located on the plaza between General Buildings II and III, Möbius Strip is based on the mathematical principle known as topology.
- f. Flower Illumination Forest is a dynamic piece of installation art demonstrating basic geometric principles.



The main exhibition area, dubbed the STEAM Interactive Exploration Hall, is on the first floor of the Education Building, and includes 23 pieces of interactive art created by the Research Center for Technology and Art. Amongst these is The Wondrous Golden Angle, which uses the golden angle principle of mathematics and the optical illusion known as "persistence of vision" to make a 3D printed flower appear to come alive and bloom. Also on display is Magic Ellipsis, a board with a hole into which a ball rolls after being set in motion from any starting place, which inspired one elementary school student to imagine a tennis training court with a similar design, obviating the need to continuously collect stray tennis balls.

As part of its ongoing efforts to use art to promote science education, NTHU has recently teamed up with the Taipei City Department of Education's Excellence in Art education program to establish the Science through Art Competition. More than 30 groups of elementary school teachers entered the competition, and the ten finalists are featured in the STEAM Interactive Exploration Hall.

The three winners of the Competition were announced at the opening ceremony, with the first prize going to Taipei City Fude Elementary School teacher Lin Mengfeng (林孟峰) for his entry Colored Rubik's Cube, which demonstrates basic optical

principles by exhibiting various colors when viewed from different angles.

Dean Hsu said that interdisciplinary education needs to start at an early age, and that one of the main goals of the Festival is to expose children to various principles in science and math, so that they are more receptive to them when they begin to study them in class later on.

The volunteers for this year's Festival were mainly members of NTHU's Science Service Club and Happy Kids Club, who introduced the children to the various entries and also gained valuable experience for creating their own entries for future Festivals.

- g. Deputy Director Lee said that she is pleased to see that NTHU has extended the scope of its teacher training to primary and secondary schools' students.
- h. President Hocheng (right) conferring the first prize in the Science through Art Competition to Lin Mengfeng, a teacher at the Fude Elementary School, Taipei.



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Degree Student

Fall Semester Application Graduate Program: January
1~March 15

Undergraduate Program: November 15~February 15

Spring Semester Application: August 15 to October 16

Exchange Student

Fall Semester Application: February 1~ April 15

Spring Semester Application: September 1~November 1



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