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NATIONAL TSING HUA UNIVERSITY

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THE 2016 COMMENCEMENT

The 2016 Commencement was held on June 5th at the university auditorium. Amongst the graduates was a new bachelor of economics from Malaysia who started to work part time when he was a freshman to save money for plane tickets so that his parents could come to his anticipated graduation. Kee Zhen-shun recalled that "for a long time I have been looking forward to giving my parents a chance to experience their son's university life at NTHU." It was only at the beginning of this year that he was finally able to purchase the air tickets, and since then he had been happily looking forward to their arrival. It turned out Mr. Kee's graduation was a happy occasion for reuniting his entire family. In addition to his parents, his grand-parents also made the trip to celebrate his graduation.

In his commencement speech, President Hong Hocheng said, "An accomplished scholar is not a utensil," a quote from the Confucius' *Analects* meaning that the ability of a truly learned person is not confined to any one thing. This was a way of encouraging the graduating students to avoid being hampered by self-limitations, and encouraging them to continue cultivating their abilities and broaden their mind. President Hocheng also urged the graduates to set high goals for themselves, to actively explore the world, and to always be open to learning from others, regardless of their age, ethnicity, or socio-economic status.

Alumnus Liu Jong-min, President of the Industrial Technology Research Institute (ITRI), delivered an address in which he stated that, rather than repeating the cliché "think globally, act locally," he would like to encourage new graduates to "think locally, act globally." To explain his view, Liu presented two examples from his experience at ITRI. First, he described how over the course of a few short years the highly polluting vehicles used at the Xiluo Produce Market in Yunlin County were completely replaced

Bashir Bastien from Haiti is the second international student to ever receive the Mei Yi-qi Memorial Medal.

by electric ones, and that this same technology could be introduced to other countries where air and noise pollution are still a major problem, such as India.

In his second example, Liu described how a prosthetic device—something like the powered suit of armor in the film Iron Man—was invented in Taiwan to help a paralyzed doctor standing up, and is now being developed in the U.S. to assist injured soldiers. With these examples, he encouraged the new graduates to be leaders rather than followers—to find meaningful problems, solve them by applying what they learned at NTHU, and then find ways to apply their creative solution in other parts of the world.

Representative of the graduating graduate students Huang Jing-yi, Department of Power and Mechanical Engineering, gave an address in which she reflected on her six years at NTHU. She stated that there were good times, tough times, and times when she wondered if she would ever finally graduate; but she believes that as long as one is studying something one has a passion for, then things will eventually turn out well as in her own case. She also stated that in addition to the career benefits of being a graduate from a prestigious university like NTHU, what really matters for her is the conscientious, practical, and persevering attitude towards research she has learned during her time at NTHU.

Representing the graduating undergraduates, Wang Yi-ning of the Department of Foreign Languages gave an address in which she recalled that one of the most important things she learned at NTHU is how to maintain an open-minded outlook toward the world. She also said that all the learning and experience she gained at NTHU makes her feel as though she is standing on the shoulders of a giant, gazing far into the future. She also encouraged all the new graduates, wherever their lives may take them, to be sure to live up to their highest ideals.

During the ceremony the Mei Yiqi Memorial Medal—NTHU's highest academic honor—was awarded to six outstanding undergraduates: Chang Bao-sheng of the Department of Life Science, Bashir Bastien of the Department of Economics, Cheng Chi-shun of the Department of Chemistry, Chang Jer-rong of the Department of Engineering and System Science, Chen Ya-shin of the Department of Quantitative Finance, and Wang Chun-ping of the Department of Power and Mechanical Engineering. Bashir Bastien is from Haiti and is the second foreign student to ever receive the Mei Yi-qi Memorial Medal.

This year NTHU awarded 1,780 baccalaureates, 1,800 master degrees, and 313 doctorates.

a Mr. Kee Zhen-shun (center), graduate of the Department of Economics, worked part-time during his studies to save enough money to buy plane tickets so that his parents could attend the commencement ceremony.

b President Hong Hocheng reminded the new graduates that "An accomplished scholar is not a utensil."

c Student representative presenting a bouquet to President Hocheng.

NTHU EXCELS IN RESEARCH, PUBLICATION, AND PATENT ACQUISITION

NTHU ranks high in the Category of Citations of QS World Universities Ranking. According to the newly released QS Report (2016-17), NTHU continues to improve in its overall ranking. It moves up from the 155th last year to the 151st this year. The ratio of citations obtained per faculty member is, according to the QS, "a ratio used to measure the average citations obtained per faculty member, and is an estimate of the impact and quality of the scientific work produced by universities."

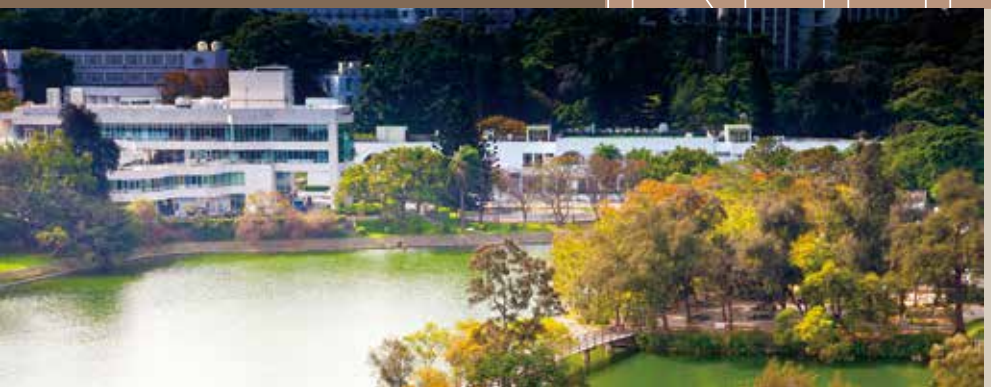
NTHU ranks the 15th worldwide for the past two consecutive years in this important area that measures scientific impact of her faculty members' research and publications. No other Taiwanese university ranks higher than NTHU. In fact, among the first fourteen universities that rank higher than NTHU, nine of them have a perfect score of 100 in the Citation per Faculty category. NTHU receives 99.6, right behind UC Berkeley (99.8) and Stanford (99.7).

The National Academy of Inventors (NAI) and the Intellectual Property Owners Association (IPO), both based in the US, recently announced their "Top 100 Worldwide Universities Granted U.S. Utility Patents in 2015." NTHU ranked 15th in the world, the highest position amongst all universities in Taiwan, an honor NTHU has held every year since 2012.

In 2015 NTHU faculty received 101 US patents; by adding to this figure the patents granted in Taiwan, mainland China, Japan, and the EU, the total number of patents received by NTHU faculty in 2015 comes to 307. Amongst these, the largest number of patents were received in the area of photonics and optics (66), followed by pharmaceuticals and biochemistry (57), materials and chemical engineering (56), and electronic machinery (53).* It should be noted these patents are with a wide range of applications, not limited to the field of information and communication.

A large number of technologies for which NTHU has received patents have been successfully commercialized for industrial use. Last year, the university completed 137 technology transfer cases worth NT$114.43 million, a record high. NTHU's income from technology transfers for the first six months of this year come to NT$108.9 million,

The newly completed building of NTHU's Innovation Incubation Center.



95% of last year's total; and we estimated that this year's total will be 138% of last year's, another new record.

According to President Hong Hocheng, NTHU's high ranking in patents acquisition amongst more than 50,000 universities worldwide is a testament to the creativity of its faculty members and students and an indication of their valuable contributions to the future of industry and to society as a whole.

NTHU's excellent reputation for innovative research and development has led many manufacturers to propose cooperative projects with the university. For example, a procedure developed by NTHU researchers to use boron neutron capture therapy (BNCT) to treat liver cancer tumors (patented in Taiwan and the US) has already been transferred to the Taiwan Biotech company, which is currently conducting clinical trials.

Fact file - **National Tsing Hua University**

THE **TOP** UNIVERSITIES
IN THE WORLD 2016/2017

PERFORMANCE BY INDICATOR - YEAR 2016

Academic Reputation	56.8
Employer Reputation	42.2
Faculty Student	22.5
Citations per Faculty	99.6
International Students	18.5
International Faculty	32.1

Ranks by Indicator	
Academic Reputation	161
Employer Reputation	294
Faculty Student	501+
Citations per Faculty	15
International Students	501+
International Faculty	385

Empty records are due to missing data or a performance below the publication threshold for each indicator.

Source: QS World University Rankings -2016 Fact File

National Tsing Hua University - Rank in Taiwan - Evolution by Indicator

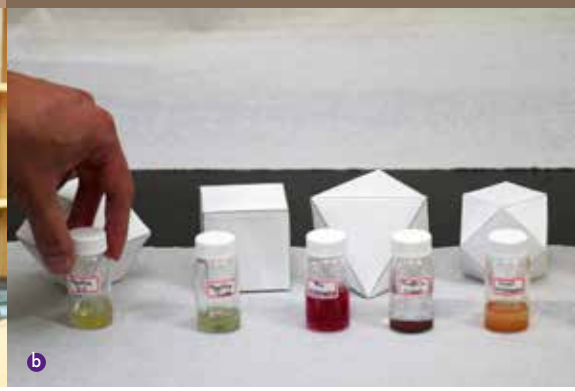
	2012	2013	2014	2015	2016
Overall	2	2	2	2	2
Academic Reputation	2	2	2	2	2
Employer Reputation	3	3	2	2	2
Faculty Student	11	13	12	12	12
Citations per Faculty	1	2	2	1	1
International Faculty	2	2	2	2	2
International Students	10	10	9	9	7

Green colours indicate better results.

Institutions Evaluated in Taiwan by Year

2012	14
2013	16
2014	16
2015	16
2016	15

Source: QS World University Rankings -2016 Fact File



PROFESSOR MICHAEL H. HUANG RECOGNIZED AS TOP RESEARCHER IN MATERIALS SCIENCE

ⓐ Professor Michael H. Huang of the Department of Chemistry.
ⓑ Various forms of nanometer particles.
ⓒ Professor Huang's research team.

MSE Suppliers has recently published its list of 300 most-cited researchers in the field of materials science and engineering, amongst which is Professor Michael H. Huang of NTHU's Department of Chemistry. The list is compiled using citations of the corresponding author or the first author of the paper; Professor Huang is the only Taiwanese researcher ranked in the top 300, and his papers have been cited more than 16,000 times.

"I'm pleased to have received such an affirmation!" stated Huang, who began working at NTHU after completing his post-doctoral work at UC Berkeley. Huang's research has long had a major impact, and he was ranked third in the "World's Top 100 Materials Scientists" published in *Science Watch* in 2011.

Since 2007, Huang has been leading a research team working on the seldom-studied topic of controlled synthesis of nanoparticle shape in metals and semiconductors. They have succeeded in devising a mechanism for producing a variety of orderly crystals, which, along with their findings on the relationship between the crystallographic plane and the optoelectronic properties, has had considerable international impact.

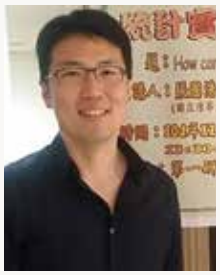
Huang's research team is one of very few specializing in this area. According to Huang, "Actually, it's relatively easy to get started with nanoparticle synthesis. Anyone can do it, but the key to our success has been recognizing its potential before others, and then diligently researching it over a long period of time."

Since 2004 Huang's papers have been cited over 5,000 times with an average of 61 citations per paper, indicating that his research has had a significant influence worldwide.

Amongst those on the MSE list of the world's top 300 outstanding materials science researchers, the largest number were at Northwestern University (11), followed by Rice University (8), the University of Texas at Austin (7), Tsinghua University in Beijing (7), and the University of California, Berkeley (6).

THREE FACULTY MEMBERS WON THE ACADEMIA SINICA JUNIOR RESEARCH INVESTIGATORS AWARD

Amongst the winners of the 2016 Academia Sinica Junior Research Investigators Award are three NTHU associate professors: Kuo-Hao Chang of the Department of Industrial Engineering and Engineering Management (mathematics and physical sciences division); Chen-Bin Huang of the Institute of Photonics Technologies and the Department of Electrical Engineering (mathematics and physical sciences division); and Kean-Fung Guan of the Department of Chinese Literature (humanities and Social Sciences division).



Associate Professor Chang Kuo-Hao of the Department of Industrial Engineering and Engineering Management.

KUO-HAO CHANG: GLOBAL EXCELLENT AND LOCAL RELEVANT RESEARCH IN STOCHASTIC OPTIMIZATION

After completing his Ph.D. in Industrial Engineering at Purdue University in 2008, Kuo-Hao Chang taught at West Virginia University before returning to Taiwan to teach at NTHU, his alma mater. Chang's main research area is optimal decision-making in an uncertain environment (stochastic optimization), and is currently focusing on the development of effective stochastic optimization algorithms. His research, while theoretical, is motivated by real problems. So far he has finished over 20 industry projects that successfully applied the developed methods to benefit the industry in terms of the significant yield enhancement, production cost reduction and efficiency improvement. Since returning to Taiwan he has published a series of articles about simulation optimization algorithms in prestigious journals. Amongst these, his co-authored article "*Stochastic Trust-Region Response-Surface Method (STRONG)-A New Response Surface Framework for Simulation Optimization*" was published in the prestigious international *journal INFORMS on Computing*, and

has been lauded as the most significant breakthrough in the past fifty years.

In recognition of his outstanding contributions to the fields of operations research and optimization at a young age, Chang was awarded the 2012 Bonder Scholar Research Award from INFORMS and K.D. Tocher Medal from The OR Society for which he is the only Taiwanese who has ever won these two awards. He is also a recipient of 2015 IIE Transactions Best Application Paper Award and IIE Transactions is one of the top journals in the fields of industrial engineering and operations research

Prof. Chang is grateful for the support he has received from the Ministry of Science and Technology, NTHU, the Institute for Information Industry, and his colleagues and research assistants in the Department of Industrial Engineering and Engineering Management. In addition, Prof. Chang would also like to thank his family and friends for all their unflagging support and encouragement.

Associate Professor Huang Chen-bin, Mrs. Huang, and their lovely daughter.

CHEN-BIN HUANG: A RISING STAR IN PLASMONICS RESEARCH

After completing his Ph.D. in Electrical and Computer Engineering at Purdue University in 2008, Chen-Bin Huang returned to Taiwan and began teaching at the Institute of Photonics Technologies and the Department of Electrical Engineering at NTHU, his alma mater. His current research interests include plasmonics, ultrafast optics, nonlinear optics, and millimeter-wave photonics.

In training his graduate students, Huang emphasizes practicality and diligence, and gives equal weighting to theory and experimentation. He envisions that his research team will have significant contributions to the development of ultrafast plasmonics in the near future. His research papers have been published in leading scientific journals.

In his acceptance speech Huang extended a special word of thanks to his three main research assistants: Wei-Yi Tsai, Chen-Ta Ku, and Ching-Fu Chen, all M.S. students in the Institute of Photonics Technology. He also expressed gratitude for the encouragement provided by his research associates Jer-Shing Huang, Heh-Nan Lin, and Pei-Kuen Wei; the facilities provided by the Institute of Photonics Technologies and the Department of Electrical Engineering; and for the comradeship of all his colleagues at NTHU. Finally, Huang thanked his family for being like a bright and genial lamp on the bumpy and sometimes lonely road of scientific research.

Associate Professor Guan Kean-fung of the Department of Chinese Literature.

KEAN-FUNG GUAN: EXPLORING THE LANDSCAPE OF LATE QING LITERATURE

After earning his Ph.D. in Chinese Literature at National Chengchi University, Kean-Fung Guan began teaching at NTHU's Department of Chinese Literature.

Guan specializes in modern Chinese literature, especially late Qing novels, investigating such questions as: How did late Qing novelists use their writing as a way of reflecting on their position within the turbulent society of 19th century China? How did the Chinese literary tradition begin to engage in a dialogue with the new intellectual trends appearing on the scene during the late Qing? and What was the nature of the paradigm shift in literature brought about by these intellectual trends? Guan has written numerous papers examining how a variety of new and old ideas are treated and developed in late Qing novels, including From the Body to the World: A Map of the New Concepts Found in Late Qing Novels. He is also the co-editor of the book Revolution, Awakening, and Expression: Research in Modern Chinese Literature and Culture. His papers have been published in leading journals and have been well received by the academic community.

As an avid traveler, Guan believes that the reason why themes such as "utopia", "the world", "adventure", and "Africa" appeared so frequently in late Qing novels might be due to the deep-rooted urge to travel and experience the outside world of the novelists. He further asserts that the fragmentary recollections of a journey are rather like the flash of a fish scales, the smell of a palm tree after the rain, a vague sense of nostalgia, or an evanescent vapor; they fleetingly and eternally glitter on the traveler's life-map.

In Guan's mind, receiving this award seems to confirm that there could be a happy coincidence between one's personal hobby and research interest. Very interested in travelling, Guan teaches a course titled "Travel and Literature," which brings together literature, research, and his own travel experience; this is one of the ways by which he encourages his students to pick up their backpacks and head off into the distant unknown.

In accepting this award, Guan thanked NTHU for providing a research environment which emphasizes quality over quantity, where he has sufficient time to investigate topics which have previously received but scant attention. For Guan, in-depth research on fundamental issues in literature is always an exacting procedure that takes shape over an extended period of time, rather like a constructing a building.

The Academia Sinica Junior Research Investigator Award was established in 1996 by Academia Sinica to encourage junior domestic scholars to conduct in-depth scholarly research and make important contributions in their respective disciplines. The Award is divided into three divisions: mathematics and physical sciences, life sciences, and humanities and social sciences.

SEMICONDUCTOR PIONEER BURN LIN JOINS NTHU

Dr. Burn Lin's work in the development of immersion lithographic technology changed the history of the semiconductor industry. Former Vice President of Research and Development at the Taiwan Semiconductor Manufacturing Company (TSMC), Dr. Lin has recently joined NTHU as a chair professor. On his special appointment Dr. Lin stated that, in addition to imparting professional knowledge, he plans to teach students how to solve problems.

When Dr. Lin, widely regarded as a "national treasure", retired from TSMC at the end of last year, many different universities were eager to recruit him as a faculty member. However, in the middle of last year NTHU had already offered Dr. Lin the Hou Jindui Professorship, and in the end he decided to join NTHU.

Professor Burn Lin

Dr. Lin said that his original retirement plan included only two activities: propagating the gospel and helping people to enjoy more prosperous lives. Afterwards, however, he realized that teaching is also a good way of helping people enjoy prosperity. As Lin put it, "During my 46 years in the semiconductor industry I learned a lot, and now I'd like to share that with the next generation. In addition to imparting professional knowledge, I hope to stimulate students' creativity, as well as their problem-solving and teamwork ability."

"No matter what the problem is, you have to be prepared to adopt different approaches to solving it," says Lin. In the past, semiconductor wafers were mainly manufactured using a dry exposure process, with air as the medium between the lens and the wafer, so that the figure on the transparent media adapter would form an image on the wafer. However, it proved very difficult to increase the resolution, which required shortening the wavelength of the light source from 193 nm to 157 nm. In order to solve this problem, Lin proposed using immersion lithography—replacing the air gap between the final lens and the wafer surface with a liquid medium that reduces the wavelength of light in water to 134 nm, making it possible to carve a more precise wafer. This innovation has had a major impact on the semiconductor industry.

Over the course of his long career, Lin has met many graduates of NTHU, whom he has found keen to learn and eager to conduct research. Yet he also realized that while at school they were so

focused on their individual academic performance that they found it difficult to work cooperatively as part of a team after they started to work in the industry. Thus teamwork is something he plans to emphasize in his teaching.

Shawn Hsu, the director of the Department of Electrical Engineering, said that Lin is a leading figure in the developmental history of the semiconductor, and a pioneer in optical lithography. Thus NTHU is highly honored to have him join its faculty.

Huang Yen-chieh, the director of the Institute of Photonics Technologies, pointed out that, in addition to his important role in the semiconductor industry, Lin has also served as the editor-in-chief of the Journal of Micro/nanolithography, MEMS, and MOEMS. Moreover, his experience and outstanding academic contributions make him a highly valuable addition to NTHU.

Since being appointed to the Institute of Photonics Technologies, Dr. Lin has conducted three workshops in which he discussed the lithography manufacturing process and the development of the photonics field. Dr. Lin said that he is highly interested in the research being conducted in the Institute of Photonics Technologies, and that he hopes to participate in some of its research projects.

During his 22 years at the IBM research center in the United States, Dr. Lin played a leading role in the research teams credited with various ground-breaking innovations, including lithography technologies at a resolution of 1.25 microns, 1 micron, 0.75 micron, 0.5 micron, and 0.35 micron. After leaving IBM Dr. Lin set up his own business in the United States and ran it for nearly 10 years. He joined TSMC in 2000, and in 2002 he began to develop immersion lithography, a technology which has had a major impact on the global semiconductor industry. At TSMC he led a research team which successively reduced lithography resolution from 130 nm, to 90 nm, 65 nm, 40 nm, 28 nm, 20 nm, 16 nm, 10 nm, 7 nm, and 5 nm.

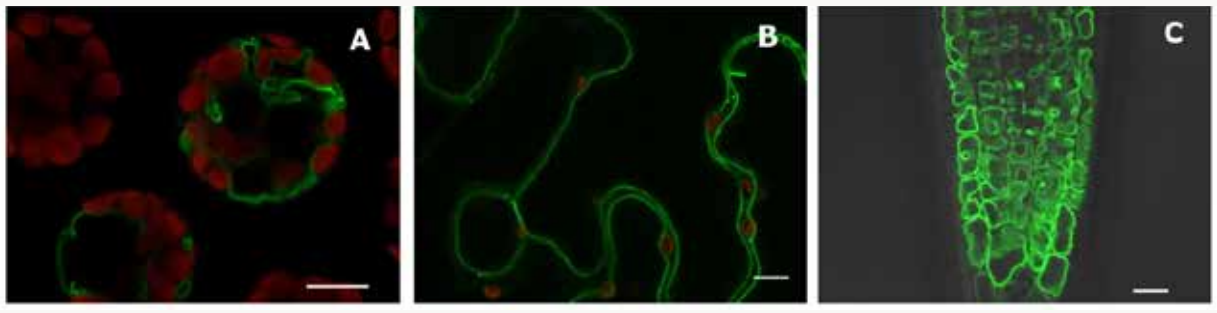
Dr. Lin has received numerous honors and awards, including 10 IBM Invention Awards, and the IBM Outstanding Technical Contribution Award. In 2008 he was elected to the National Academy of Engineering. In recognition of his pioneering work in immersion lithography, the Institute of Electrical and Electronics Engineers (IEEE) awarded him the Jun-ichi Nishizawa Medal in 2013, and the Cledo Brunetti Award in 2009. In 2013 he was elected a fellow of the Industrial Technology Research Institute. In 2008 he received the Ohio State University Distinguished Alumni Award. In 2004 he received the first Frits Zernike Award from the International Society for Optics and Photonics (SPIE). In 2004 he received the Outstanding Research Award from the Pan Wenyuan Foundation. In 2003 he was elected fellow of IEEE as well as fellow of SPIE. And in 2014 he was elected fellow of Academia Sinica, the highest academic honor awarded in Taiwan.

UNRAVELLING THE MYSTERY OF VACUOLAR PHOSPHATE TRANSPORTER

Inorganic phosphate (Pi) is an essential nutrient required for plant growth, and thus is one of the main ingredients of fertilizer. Scientists know that more than 70% of the total Pi in plants is stored in the vacuole, but for about half a century, no one has been able to discover how it actually gets there. An interdisciplinary research team coordinated by Dr. Tzu-Yin Liu, assistant professor in the Institute of Bioinformatics and Structural Biology, has recently used magnetic resonance imaging (MRI) to resolve this mystery. Their discovery makes it possible to reduce the amount of phosphate fertilizer used in agriculture, thereby alleviating soil pollution. A report on their groundbreaking study was recently published in the renowned *Nature Communications.*

This research project was directed by by Dr. Tzyy-Jen Chiou of Academia Sinica's Agricultural Biotechnology Research Center. In addition to Dr. Liu, the research team included Associate Prof. Fu-Nien Wang and Ph.D. student Sheng-Min Huang, both of the Department of Biomedical Engineering and Environmental Sciences of NTHU; and Shang-Yueh Tsai, Associate Professor at National Chengchi University's Graduate Institute of Applied Physics. By using the NMR spectrum generated by the 7T-MRI equipment of the Translational Molecular Imaging Center at the Linkou Chang Gung Memorial Hospital, they were able to "visualize" the Pi content in the cytoplasm and in the vacuoles of Arabidopsis thaliana seedlings. They also confirmed that the SPX-MFS gene family is the long-sought-after vacuolar Pi transporters – the plant Pi transporter Type 5.

According to Dr. Liu, vacuoles can store a variety of nutrients through different membrane proteins on the vacuolar membrane. Yet



Vacuole phosphate transporter protein, in fluorescent green, fusing with protein in (a) Arabidopsis mesophyll cells (without the cell wall); (b) tobacco epidermal cells; and (c) the root of transgenic Arabidopsis (i.e., with a large number of vacuoles containing phosphate transporter).

for a long time scientists were unable to find the membrane protein by which Pi was transported into the vacuole. By using MRI, they were able to observe the Pi content in the vacuoles of Arabidopsis seedlings and found the "door" by which Pi enters the vacuole, i.e., the plant Pi transporter Type 5. Arabidopsis is a cruciferous plant widely distributed in Europe, Asia, and northwest Africa. It has a short life cycle and grows well in the small space available in the basic biology laboratory, and is relatively amenable to mutagenesis, transgene transformation, and genetic analysis. Moreover, it was the first plant to have its genome completely sequenced. Thus it is frequently used as a model organism in plant research.

Dr. Liu points out that the Arabidopsis mutants lacking the plant Pi transporter Type 5 accumulated more Pi in the cytoplasm. Conversely, overexpression of the Pi transporter Type 5 increases the Pi content in the vacuole and decreases the Pi content in the cytoplasm, leading to the impaired cytoplasmic Pi homeostasis. In other words, a large amount of the Pi transporter Type 5 protein in Arabidopsis facilitates entry of Pi into the vacuole and the storage therein. However, when the external environment provides an adequate supply of Pi, the Arabidopsis plants overexpressing the plant Pi transporter Type 5 accumulate Pi in the vacuole, where it cannot be effectively utilized, so that the plant cell senses the shortage of cytoplasmic Pi, thereby activating the Pi deficiency-responsive genes that retarded plant growth.

MRI is commonly used in medical research, but this time it was exploited to open a new avenue for plant study. Dr. Liu says that in the past some plant research was conducted by using nuclear magnetic resonance (NMR)—the predecessor technology of MRI—but its use with living plants was often subject to limitations of space allowed for placing samples. Wang's participation in the project was initiated by Professor Rong-Long Pan of NTHU's College of Life Science.

According to Dr. Wang, the major task of his laboratory is to develop imaging technology to measure neural activity and the flow of blood in the brain. Although he has previously allowed his students to use fruits and vegetables to practice scanning, he did not expect that this molecular imaging technology could have a practical application in plant science and lead to an important breakthrough.

Dr. Tzu-Yin Liu in the Institute of Bioinformatics and Structural Biology

As for the practical future benefits of their discovery, Dr. Liu says that it can be used to improve agricultural practices by enhancing the efficient usage of the internal Pi required for plant growth, thereby making it possible to reduce the use of Pi fertilizers in agriculture—one of the major sources of soil pollution. The research findings also create a new territory in the study of vacuolar Pi transporters.

NOBEL LAUREATE JEROME FRIEDMAN EXHORTS STUDENTS TO FIND THEIR PASSION

The 2016 Nobel Laureates Lecture at NTHU was delivered by Professor Jerome Friedman, who received the Nobel Prize in Physics in 1990 for his work showing an internal structure for protons later known as quarks. In a talk titled "The Observation of Quarks in the Proton" Friedman shared his experience in research and life in general with an audience consisting of the NTHU community, high school students, and the general public. He encouraged students to find their passion and then fully apply themselves to it, and to choose a job they would really look forward to going back to every Monday morning.

As a high school student Friedman excelled in art and spent two or three hours a day painting and drawing. He was offered a scholarship to study at the Art Institute of Chicago but turned it down in order to study physics after reading a book on relativity written by Albert Einstein.

To all those present it was apparent that Friedman has a passion for physics. He said that when he comes home from work he often scribbles his ideas down on paper; seeing this, his wife urges him to relax, to which he customarily replies that this is how he relaxes.

Friedman was born in Chicago in 1930 to Jewish immigrants from

Professor Jerome Friedman (center) with Taiwanese students.

This year's Nobel Laureates Lecture at NTHU was delivered by Jerome Friedman, who was awarded the Nobel Prize in Physics in 1990.

Russia. His parents received little in the way of formal schooling, and had to work very hard just to make a living, yet they gave great importance to their children's education, including music and art. He believes that this may be why when thinking about physics or other subjects, what appears in his mind are images rather than formulas. To this day, Friedman continues to paint and draw, and his work has been displayed at a local art gallery in Chicago.

While attending the University of Chicago, Friedman studied under Nobel laureate Enrico Fermi, world-renowned for his work in both theoretical and experimental physics. Fermi was also the advisor and main professor of Lee Tsung-dao and Yang Chen-ning in the 1940s, and Friedman's first important research position involved verifying the model of parity violation they proposed in 1956.

In 1960 Friedman joined the physics faculty of the Massachusetts Institute of Technology (MIT). Afterwards he joined Stanford University's Linear Accelerator Center (SLAC) and began working on electron scattering experiments (using high-energy electrons accelerated to the speed of light to hit a particular substance in order to study the detailed composition of that substance). From 1967–1975 he and his colleagues at SLAC conducted a series of scattering experiments which provided the first experimental evidence that protons have an internal structure, later known to be quarks. This groundbreaking research led to their being awarded the Nobel Prize in Physics.

Between 1983 and 1988 Friedman served as the director of MIT's Department of Physics, and also served as Chairman of the Scientific Policy Committee of the Superconducting Super Collider Laboratory. Since retiring he has been giving interviews and talks worldwide, and takes every opportunity to introduce basic physics to students and the general public. His unique educational background and broad interest in the humanities and arts make his talks highly edifying for students in a wide range subjects.

NTHU STUDENT STEALS THE SPOTLIGHT AT THE PRESIDENTIAL OFFICE

On June 21 President Tsai Ing-wen received a delegation of 60 international youth volunteers, amongst them were 15 excited members of NTHU's International Volunteer Society. One of the group photos taken during the event received considerable attention due to the lovely expression of one of the members of a NTHU delegate. It was later placed on the President's Facebook fan page and has received lots of positive comments.

The person behind this amusing photo is Chie-yi Chang, a first-year M.A. student in the Department of Physics. Prior to departing for a volunteer program in Tanzania on July 11, Chang said that she was really excited to be standing right next to the president for a photo. Chang previously traveled independently in West Africa. Thus she was quite surprised when she discovered that it was even more

The amusing photo of Chie-yi Chang with President Tsai which has attracted lots of attention.

arduous to prepare for the volunteer program in Tanzania. One source of inspiration that helped her persevere were the words of encouragement offered by President Tsai: "Living in a new and unfamiliar place will make you grow up very quickly."

Also present at the meeting with the president was Chia-ying Yu, a first-year M.A. student in the Department of Linguistics and the leader of the volunteer team in Tanzania. Prior to the meeting, Yu mentioned it to a friend who is a vice principal at an elementary school in Tanzania. Her friend was amazed that an ordinary citizen could meet the president—something which in Tanzania is basically impossible. During the meeting Yu shared this anecdote with President Tsai, who replied that in a Democracy it's the citizens who are actually the leaders, so meeting the president shouldn't be seen as anything special. Tsai also encouraged her-visitors to not be intimidated just because they were in the Presidential Office, and that it's important to maintain self-confidence when meeting people.

Another member of the NTHU delegation, Ru-yun Chiang , a second-year M.A. student in the Department of Materials Science and Engineering, said that while entering the Presidential Office she felt like she was going to meet an icon, and that it was especially exciting to be entering by the same route Tsai used during her inauguration ceremony. During the event the members of the international volunteer societies at different universities also had a chance to chat and share their experiences with each other.

Run by the Youth Development Division of the Ministry of Education, every year the International Youth Volunteer Program subsidizes volunteer programs carried out by self-organized groups with members between the ages of 18 and 30. This was the first time for the Youth Development Division to organize an audience with the President, giving youth volunteers an opportunity to share their overseas experience and enthusiasm for serving those who are less fortunate than themselves.

President Tsai Ing-wen receiving a delegation of international youth volunteers. (photo provided by the Presidential Office)

FORECAST THE FUTURE WITH AN ONLINE COURSE AT FUTURELEARN

Last month NTHU became the first national university in Taiwan to offer a Massive Open Online Course (MOOC) on FutureLearn, the largest online learning platform in the UK. NTHU's first course, Business Analytics Using Forecasting, went online on July 26, and is taught by Galit Shmueli, distinguished professor at Institute of Service Science, College of Technology Management. The course focuses on using quantitative forecasting to make business decisions, such as forecasting the customer flow at a restaurant or the most suitable locations for bike-sharing stations.

MOOCs are offered free of charge by universities around the world, and allow students to learn at their own pace. They have become quite popular in recent years, and NTHU established its own MOOC platform in 2013.

According to Prof. Nyan-Hwa Tai, Vice President of Academic Affairs, the contract that NTHU recently signed with FutureLearn marks the NTHU's entry into the English-speaking educational market, and gives students on the other side of the world an opportunity to become familiar with the high quality of education offered in Taiwan.

FutureLearn is a MOOC learning platform founded in 2012 by The Open University in Milton Keynes, England. It offers free, open-enrollment, non-credit courses in a wide variety of subjects, all with English as the medium of instruction. FutureLearn has already had four million users. Its worldwide network currently consists of 94 partners from around the world, including Sungkyunkwan University in South Korea, Fudan University in Shanghai, and the Shanghai Jiao Tong University.

In her course Prof. Shmueli will focus on presenting popular forecasting models and teaching students how to design and implement their own forecasting method. The main learning activities consist of weekly textbook readings and videos, together with online discussions and demonstrations

Prof. Galit Shmueli introduces her course in a three-minute video which she concludes by declaring huanying guanglin.

which make the course highly practical and interactive. Thus the course will enable students to understand how to define prediction problems, assess the effectiveness of prediction models, and apply what they've learned to business decisions.

Prof. Shmueli, from Israel, introduces the course in a three-minute video which she concludes by welcoming her students in Chinese—huanying guanglin.

NTHU's FutureLearn homepage.

NTHU-MOOC's first international offering was conducted in cooperation with Beijing Tsinghua's xuetangX. In 2015 NTHU became the first university in Taiwan to accept course credits earned thru MOOC courses recognized by Taiwan's National Open University. In February 2016 the six MOOC courses being offered by NTHU were included in a platform created by mainland China's Ministry of Education, and attracted the participation of 270,000 students.

For more information on Business Analytics Using Forecasting, see https://www.futurelearn.com/courses/business-analytics-forecasting

For more information on NTHU, see https://www.futurelearn.com/partners/nthu

NTHU

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