



# NTU HIGHLIGHTS

Special Report

## APRU Discusses Digital Future



Biomedical Scientists  
Learn More About  
Mikado Pheasant

- NTU, Academia Sinica Strengthen Ties
- Agriculture Incubator Established on Yunlin Campus
- Future Engineers Focus on Teamwork

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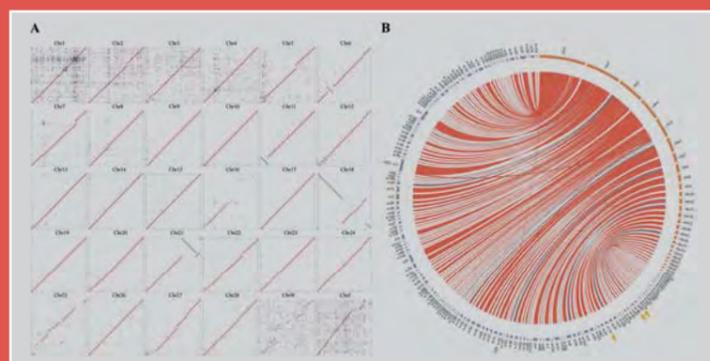
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A chromosome-level comparison of the Mikado pheasant and the chicken.

(A) A syntenic map of the Mikado pheasant and chicken genomes. The x-axis specifies the chromosome position in the chicken, whereas the y-axis specifies the scaffold position in the Mikado pheasant. The red dots (or lines) indicate that the sequences were aligned in the same orientation, and the blue dots indicate an alignment with a reverse complement.

(B) A chord diagram of scaffolds with a total length greater than 500 kb and an alignment length greater than 10 kb. The orange perimeters specify the chromosomes (chr) of the chicken, whereas the purple perimeters specify the scaffolds (sc) of the Mikado pheasant. The red links represent the sequences aligned in the same orientation, and the blue links represent an alignment with a reverse complement. Yellow arrows indicate the scaffolds that were fully aligned, and gray arrows indicate the multiple alignment.

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# Interim President Tei-Wei Kuo: “Be Proud to Be Part of the NTU Family!”

NTU has been experiencing some of the most challenging times in its history during the past several months. As Interim President, I wish to offer a word of encouragement to all: every faculty member and student should take pride in being a member of NTU. “Pride” refers not to “conceit,” but to a sense of honor. With our hearts in the right place, we naturally feel we must push our beloved school forward along its journey of excellence.

To that end, we have identified three major goals. “Internationalization” is the main objective in pushing NTU to a new height. Through the globalization process, we rely on a variety of indicators to reflect on our current position, allowing instructors and professors from all over the world to create a rich, dynamic, diverse learning space, wherein every student enrolled at NTU would feel like he or she is studying at one of the world’s leading institutions of higher education.

Guiding NTU along the path toward a semi-public institution is the second goal. Rigid administrative measures and conventions are seemingly inevitable fixtures in public universities. The only way for us to get through such administrative rigmarole and come out on top is to make adjustments and simplifications in the education infrastructure and systems as government resources and support continuously dwindle underfoot. Facing the same challenges as many elite universities overseas, NTU must adapt, gain access to new sustainable funds, and stay results-oriented to allow greater flexibility in talent recruitment, payroll services, and teaching programs.

The last goal we must pursue is a smart campus community that uses various types of electronic devices to provide and

access information. The world is constantly changing, and these changes are already affecting many aspects of our lives, including mobile and online payment platforms, consumer behavior, and data acquisition. Taking advantage of new technologies to create a knowledge-based campus community with limited resources to expedite connectivity with the world, is now a crucial game changer.

“NTU first” has been my goal ever since I took over the post as Interim President. I am here to work together with all of our faculty members and students to make NTU one of the very best institutions of higher education in the world.



# 2018 APRU Annual Presidents' Meeting Held at NTU: Challenges in Our Digital Future

Lauded as “the Voice of Knowledge and Innovation,” the Association of Pacific Rim Universities (APRU) is a consortium of leading research universities around the Pacific Rim. One of its highlights every year — the Annual Presidents’ Meeting (APM), a major education summit of the world — was hosted by NTU this year. Held during June 24-26, the meeting was attended by 111 eminent higher education leaders and administrators, including 27 presidents and 40 executive vice presidents and vice presidents for international affairs, from 39 universities based in 14 countries, who gathered in Taipei to discuss the global challenges posed by our fast-changing information society.

NTU secured the honor of hosting the 22nd APRU APM (2018) three years ago and selected “Our Digital Future in a Divided World” as the main theme of this year’s event. The participants gathered for three days to discuss new challenges facing higher education in the rapidly-evolving digital era, such as applying knowledge to practice and policy in education and research and strengthening institutional capacity to tackle complex global concerns. During the meeting, 16 speakers presented overviews of the technoscape now increasingly dominated by artificial intelligence and big data. The common hope is that higher education will provide students with the latest capabilities and skills required for professional development, smart adaptation to social change, and greater civic engagement to become the positive intellectual leaders and agents of change that our world desperately needs.

“We are delighted that our APM is a platform where overviews of critical developments are provided, and the urgent questions framed,” said APRU Secretary General Christopher Tremewan. “The APM aims to ensure that the benefits of automation, big data, and information and communications technology are shared among all in society, and that powerful new technologies are used to address global challenges, such as climate change, human health, and sustaining the ecosystem,” he added.

In his opening address, NTU Interim President Tei-Wei Kuo described universities as the cradle of knowledge, talent, innovation, exchange, and social justice, as well as the

symbol of a nation’s intellectual prowess in modern society, highlighting their social obligation to feed back to society and improve human existence. However, the challenges we are presently facing, such as global warming, environmental deterioration, among others, are daunting global issues that universities worldwide must work in concert to address. That said, NTU’s primary goal of hosting the APRU APM was to identify solutions to current challenges and policy directions for future development through cooperation among world-leading universities.

The 2018 APRU APM was opened by NTU Interim President Kuo and APRU Chair, Chancellor Gene D. Block, UCLA on June 25. The first session after the opening featured a keynote speech by NTU’s former President Pan-Chyr Yang, who presented new cutting-edge research efforts and clinical translational medicine powered by Taiwan’s advancements in medical technology, and the goal of using precision medicine to achieve precision health.

The two panels held on June 25 addressed “Our Digital Future in a Divided World” and “Our Digital Future and Opportunities for Partnership.” Both panels were moderated by Louise Lucas, Asia Technology Correspondent of the *Financial Times*. The topics were discussed respectively by Prof. Toby Walsh, Scientia Professor of Artificial Intelligence, UNSW Sydney; and Prof. Peter Cowhey, Dean of Global Policy and Strategy, UC San Diego. Panelists Prof. Chang-Chuan Chan (Dean of Public Health) and Prof. Jane Hsu (Department Chair of Computer Science and Information Engineering), both of NTU, discussed the development and application of digital technology in Taiwan.

The two Presidential Forum panels held on June 26 addressed “Public Trust and the Changing Role of Universities” and “Our Digital Future in a Divided World: Opportunities and Challenges for Research Universities.” Both panels were moderated by Ms. Yojana Sharma, Asia Director of *University World News*, and all participating

university presidents were invited to share their views. The participating APRU presidents also produced a joint statement stressing that universities are laboratories for developing new knowledge and innovation and thus that all have a stake in advancing technologies efficiently in a manner that benefits societies in a future of rapid technological and industrial changes.

The 22nd APRU APM was held in the year of NTU’s 90th anniversary. All the APM participants expressed their warm wishes and congratulations to NTU reaching this milestone. NTU has been a dedicated member since APRU’s establishment in 1997, having actively participated in various APRU meetings and organized multiple international conferences and workshops. NTU vows to remain an active player in APRU to build more global connections, address global challenges, and showcase Taiwan’s research capacities as an agent for change in the journey toward a brighter future.



Group photo at APRU.



Graduates in the ceremony buzz with excitement and hope for their future.



Academicians, deans, department heads, and all the participating students pose for a group photo.

## Interim President Congratulates and Encourages Graduates to Spread Wings and Reach for the Sky

NTU's Commencement Ceremony for the 2017/2018 Academic Year was held on the main campus on June 10. In a speech titled "A Great University," Interim President Tei-Wei Kuo extended his heartfelt congratulations to all the graduates and encouraged them to spread their wings and reach for the sky. He also reminded the graduates that, with the ongoing paradigm shift in socioeconomic digitization, globalization-propelled competition would create new opportunities along with rising rivalries across the world.

Dr. Chih-Yuan Lu, President of Macronix and Chairman/CEO of Ardentec, was invited to give a keynote speech. While wishing the graduates all the best, Dr. Lu urged them to prepare well for the challenges ahead with fearlessness and to take advantage of every opportunity that presents itself. On that day, NTU's President, executive vice presidents, top administrators, and deans of all the colleges led the graduates on a farewell tour around the campus, taking in the

beauty of NTU one last time and allowing the fond moments of their college years to be imprinted in their hearts forever before they bade their beloved alma mater adieu. They also received a warm farewell from their fellow schoolmates from all the university's departments and clubs.

At 9:00 am, on the 3rd floor of the NTU Sports Center, the Commencement Ceremony featuring the turning of the tassel was conducted. The ceremony focused on the theme of "Lifelong Learning, Boundless Creativity, and International Cooperation." The graduates were urged to unlock their creativity and foresight, think outside the box, address the challenges of the future with humor and courage, become intellectual leaders, but always be solid salt of the earth people. The ceremony was open for parents to attend and also was streamed live online. Alumni from overseas and throughout Taiwan, loved ones, family members, and students were welcome to watch the ceremony in real time on NTU's homepage.



Interim President Kuo leads the graduates on a farewell tour around the campus.

## Exchange Meeting with Alumni and Faculty Academicians Helps Facilitate the Academic Development of the College of Science and NTU

To date, 66 alumni and faculty members of NTU's College of Science have earned the honor of being elected academicians of Academia Sinica at the biennial Convocation of Academicians. Following the convocation in 2012, a tea party was hosted by the College of Science for the academicians at which a proposal was made that an exchange meeting for NTU's alumni/faculty academicians and college/department heads be held every two years after the convocation.

The proposal was accepted, and the exchange meeting has been held three times since then. The third such meeting, held in the evening of July 4, 2018, was attended by 50 academicians, their spouses, and several top administrators of NTU and the Ministry of Education (MOST), including

Executive Vice President for Administrative Affairs Ching-Ray Chang, then Vice President for Academic Affairs Hung-Chi Kuo, Dean of Science Shiu-Tzung Liu, and Director General of the MOST Department of Natural Sciences and Sustainable Development Chun-Chieh Wu.

In the evening, Dean Liu opened the meeting by welcoming the attendees and then reported on the college's achievements over the last two years. These achievements included the winning of awards by early career scholars, major research findings, interdisciplinary exchange activities, and cooperative research. Course credits, earth science classrooms, and the continuing development of alumni activities have also been planned. Liu expressed hope that the academicians will exercise their influence to speak out for academic advancement and visit NTU on a regular basis to share their experiences and suggestions for enhancing the learning environment and developing young talent.

This year marks the 90th anniversary of NTU. Student representatives were invited from the departments of the College of Science to receive the attending academicians, and two students from the Department of Mathematics gave a music performance at the tea party. The Gallery of NTU History, which used to be the main library of NTU, is noted for its rich historic significance. Choosing this venerable place as the venue for the dinner allowed the academicians to revisit the library and recall their student life at NTU. The meeting also gave students a rare opportunity to reach out to the academicians and be mentored in a relaxed setting. The dinner lasted for almost three hours with a buoyant, lively atmosphere. This event will continue to be held in the future to facilitate exchanges between academicians and NTU colleges/departments so that the College and NTU as a whole can flourish and augur a brighter future.



## Academician Shing-Tung Yau Presented the Marcel Grossmann Award in Rome

NTU Chair Professor, Academician Shing-Tung Yau, was awarded the Marcel Grossmann Award on July 2, 2018 at the 15th Marcel Grossmann Meeting held in Rome, Italy. He is the first ethnic Chinese mathematician to be recognized with the award, one of the most prestigious honors in physics. Yau was widely acknowledged by members on the jury "for proving the positivity of total mass in the theory of general relativity, and perfecting as well the concept of quasi-local mass, for his proof of the Calabi conjecture, for his continuously inspiring role in the study of black holes physics." Each award recipient was presented with a silver casting of the TEST (Traction of Events in Space-Time) sculpture by the artist A. Pierelli.

Yau is regarded as one of the most influential contemporary mathematicians in the world today. His research has profoundly transformed and expanded the role of partial differential equations in astronomy, theoretical physics, and many other fields. For example, he corroborated the Calabi conjecture, providing answers to various algebraic geometry problems and proving the legitimacy of the string theory for physicists.

Dr. Yau is also the winner of various prestigious prizes given to outstanding scientists, including the Fields Medal (1982), the Crafoord Prize (1994), and the Wolf Prize (2010). He was not only instrumental in the establishment of Taiwan's National Center for Theoretical Sciences, he also serves on the Center's International Advisory Board. However, Yau's overall contribution is not limited to the above. He created the Shing-Tung Yau High School Mathematics Award to upgrade the level of talent nurturing and research in mathematics in Taiwan. To this day, Yau remains actively involved in many research projects and events, working tirelessly also to promote liberal arts education in Taiwan. Dr. Yau's notable achievements, honors, and dedication have made him a model for succeeding generations of scientists and mathematicians.

In 2016, Yau founded the Black Hole Initiative (BHI), an interdisciplinary center at Harvard University that involves collaboration between principal investigators (PIs) from the fields of astronomy, physics, mathematics, and philosophy. The BHI is the world's first center to focus on the study of black holes, and as such it offers a unique naming opportunity for potential donors. Yau's involvement in the project is a compelling example of his commitment to research and education.



Press conference at the Ministry of Science and Technology.

## Pioneering Carbon Adsorption and Capture Technology Earns INPEX Gold Medal

An NTU chemical engineering team has developed the world's first hollow metal fiber-supported sorbents for carbon and utilization (CCU) to reduce carbon emissions. The fiber contains a high content of uniformly dispersed porous silica adsorbents with large specific surface area ( $>500 \text{ m}^2/\text{m}^3$ ) which can rapidly capture carbon dioxide for efficient desorption and reuse.

The innovative design of the adsorbent has successfully eliminated the shortcomings found in traditional similar devices, including poor thermal efficiency and short lifespan. Additionally, it is easily scalable and can enhance system throughput simply by connecting the devices in a series or parallel arrangement.

As to carbon dioxide reuse, the new nanoporous metal-organic framework material not only has high catalytic efficiency, it also has a porous nanostructure with the capacity to dramatically increase reaction area and rate. The utilization of this catalyst causes the high-purity carbon dioxide and propylene oxide captured in the previous stage to react and produce propylene carbonate (PC). Currently,

this technology can yield a conversion rate of up to 75% within 24 hours.

PC is one of the raw materials used for producing high-value chemicals, such as polymer polycarbonate (PPC). Moreover, PPC can be used extensively to manufacture bio-degradable foams, plates, and disposable medical/food packaging materials. Hence, this newly-developed technology can reduce the cost of carbon capture and facilitate the development of circular economy and circular materials.

To achieve energy conservation and carbon reduction, the Ministry of Science and Technology has launched the National Energy Program and the Circular Materials Program. Combining the two programs, the NTU team led by Prof. Kuo-Lun Tung of the Department of Chemical Engineering has developed the cutting-edge innovation: "Hollow Metal Fiber-Supported Sorbents for Carbon Dioxide Adsorption/Catalytic Conversion System." This innovative technology was awarded a Gold Medal at the 2016 Invention and New Product Exposition (INPEX) in Pittsburg and the 14th National Innovation Award in Taiwan in 2017.

Additionally, the research team has established ExtreMEM Ind. Co., a startup company specializing in circular economy products. In its early phase, the company focused on the manufacture of liquid separation membranes and the export of related technologies for liquid treatments. The startup will continue introducing advanced technologies from the related academic and research communities to accelerate the industrialization of the key carbon capture and catalytic conversion technology developed by the team.



## A New Eduscape: NTU's Outreach Effort at 2018 Japan-Taiwan University Presidents' Forum

NTU Interim President Tei-Wei Kuo led a delegation including Vice President for International Affairs Luisa Shu-Ying Chang and Manager for Global Alliances Yu-Ru Yang, to attend the 2018 Japan-Taiwan University Presidents' Forum in Hiroshima, Japan during June 6-8. Dr. Kuo gave a compelling presentation on the current state, implementation, challenges, and prospects of dual degree programs between Taiwan and Japan. Joining President Kuo on the stage was President of Yokohama National University Yuichi Hasebe, and they together unveiled recent higher education collaborations between Taiwan and Japan. Citing NTU as an example, Dr. Kuo encouraged the establishment of inter-faculty connections to build a sustainable model for dual degree programs and further collaborative measures.

A dual degree program provides students with the opportunity to pursue two degrees at two different universities in two different countries. It gives students the chance to gain a truly global perspective. The biggest advantage of obtaining a dual degree is that it can dramatically increase the graduates' competitive strengths during the job-hunting process. Graduates of a dual degree program have demonstrated their academic ambition and foresight. Many organizations would instantly recognize their special strengths. They would see that these graduates have set themselves apart by having the pluck and perseverance to study in two different countries within a specific period. An international dual degree program — such as the ones explored in the forum — presents an opportunity for participants to explore a new country and experience an entirely different culture. Studying at a university is a life-changing experience, and a dual degree program gives students the chance to do it twice.

Therefore, it makes perfect sense for higher education institutions in Japan and Taiwan to deepen their dual degree program collaborations, since both countries occupy geostrategically significant positions in Asia, with strong ties that span the academic, economic, military, medical, and educational fronts. Understandably, the two countries' geological proximity and shared history also pave the way for more dual degree programs to blossom. Because of the mutual goodwill built around common interests, the Japanese and Taiwanese have been able to create strong ties.

Furthermore, the economic development of Taiwan and Japan has always been more synergistic than competitive.

The forum, reflecting what is trending in the community of higher education, was attended by presidents and vice presidents from over 100 universities based in Taiwan and Japan, including 35 from Taiwan and 67 from Japan. Besides, 18 of NTU's partner universities in Japan also took part in the forum, at which Dr. Kuo took the opportunity to invite them to visit Taiwan in November for NTU's 90th anniversary celebration. The delegation's trip to Japan proved to be fruitful and promising, as Dr. Kuo discussed potential partnerships with a dozen of Japanese universities, including the University of Tokyo, Kyoto University, Tohoku University, University of Tsukuba, Waseda University, Tokyo Institute of Technology, Osaka University, Chiba University, Yokohama National University, Niigata University, Hiroshima University, Yamaguchi University, University of the Ryukyus, and Osaka Prefectural University.

This year's forum was themed "Enhancement of Educational and Research Collaboration Corresponding to the Globalization of Society." Accordingly, a series of presentations and panels were organized surrounding the two subthemes, "Educational Aspects: Enhancement of International Education and International Student Mobility in Response to the Globalization" and "Research Aspects: Enhancement of International Research Exchange and Industry-University Collaboration for Innovation."

Among its 75 partner universities in Japan, NTU is now cooperating with seven of them to offer 21 dual degree programs, which have already benefited 102 NTU students and 27 Japanese students since 2006. The seven partner universities are Waseda University, Tohoku University, Kyoto University, University of Tsukuba, Kyushu University, Hokkaido University, and Hitotsubashi University. In the future, NTU will continue sending students to Japan while encouraging Japanese students to study at NTU. Likewise, universities in Japan will seek to improve the flexibility of their educational system as an initiative to promote studying abroad in Taiwan.

The Japan-Taiwan University Presidents' Forum was jointly organized by the Japan Committee of Universities for International Exchange (JACUIE) and the Foundation for International Cooperation in Higher Education of Taiwan (FICHET). The forum was first launched in 2016, and the just-concluded event in 2018 was the second gathering. Universities nowadays must enhance international collaboration to meet regional and global challenges that arise with the globalization of higher education. In addition, the educational and political vision of a national, regional and global knowledge society must transcend its ethnocentric conditions and imports. Guided by such a broad vision, the forum can offer a platform to continually and effectively facilitate university exchanges and collaborations between Taiwan and Japan to enhance the global eduscape.

# NTU Presents at Two Sessions at NAFSA's 70th Annual Conference

Themed "Diverse Voices, Shared Commitment," the NAFSA 2018 Annual Conference & Expo took place during May 29 to June 1 in Philadelphia. Representing a top-ranking university committed to the core values of international education, NTU leaders gave presentations in two thought-provoking sessions at the conference. NTU also arranged over 50 meetings to ensure more international collaboration opportunities.

The first of the two sessions, "Impacts of Political and Global Trends on Student Mobility in the United States, Korea, and Taiwan," featured presentations by Prof. Luisa Shu-Ying Chang, session chair and Vice President for International Affairs at NTU; Dr. Jane Gatewood, Vice Provost for Global Engagement at the University of Rochester; and Dr. Sunhyuk Kim, Vice President for International Affairs at Korea University. The trio of presenters explored how geopolitical issues in a country can affect international students' interests and their recruitment, and how international enrollment management could address these concerns.

The other session featured presentations by Ms. Linda Chang, Director for Global Alliances at NTU; Dr. Paul Allen Miller, Vice Provost and Director of International Programs at the University of South Carolina; and Mr. David Huerta,

Director of Short Term Academic Programs at Tecnológico de Monterrey. The audience was fascinated by the speakers' proposals about how institutions of higher education can establish effective character-driven, sustainable, and globalized entrepreneurial ecosystems to advance intercultural learning.

The two sessions with presentations by NTU leaders inspired a flurry of discussions among attendees from Europe, Asia, and the Americas. Many of the attendees sought out NTU presenters after the sessions to build networks with them. The NTU presenters effectively promoted the adaptability and innovation agendas of Taiwan's higher education community.

NAFSA is noted for the rich networking opportunities it provides to engage global educators and encourage them to build communities. Besides sessions, roundtables, workshops, and exhibitions, it offers campus tours and "Partner Days." NTU delegates participated in the "Partner Day" hosted by its partner university, Temple University (TU), and visited its acclaimed campus of gardens. NTU also joined Universität Hamburg, Ewha Woman's University, and the Chinese University of Hong Kong to discuss trilateral collaboration with TU.

Besides student exchange programs, NTU also joined TU's Dual Bachelor's Master's Degree Program; one of NTU's students will complete this program in 2018. This program combines undergraduate study at the student's home institution with graduate coursework at TU, leading to a bachelor's degree from the home institution and a master's degree from TU, all within five years.



Faculty members of the NTU College of Bioresources and Agriculture join keynote speakers for a photo.

## 2018 APSafe Conference Addresses Pressing Concerns about Climate Change and Food

Global warming not only puts animals and humanity alike at risk, it also wreaks adverse effects on crop production.

Recent research indicates that warming temperatures are increasingly impacting global crop production. With climate change and food concerns front and center on the world's mind, the NTU Department of Bio-Industry Communication and Development hosted the 2018 APSafe Conference in collaboration with EurSafe from May 10-12. During the conference, researchers concerned about the supply and sustainability of key food commodities presented their latest research findings and shared their insights into crop production and food ethics in the context of climate change.

This conference on "Climate Change and Food: Challenges for the Future" was aimed to explore the multiple challenges related to food ethics. More than 60 presentations and about a dozen poster presentations were put forward by scholars and researchers from over 10 countries on a wide range of topics. The topics included crop production in climate change and ethics; animal production in climate change and ethics; planning and land ethics; consumer and food safety;

food and agricultural education; gender and food; indigenous peoples' food sovereignty; globalization of Japanese food culture; and ethnic groups and food cultures. By facilitating the exchange of ideas, this interdisciplinary conference engaged scholars of the humanities, social science, natural science, agriculture, and food science to offer counsel for cleaner, climate-friendlier practices to promote sustainable farming and food production.

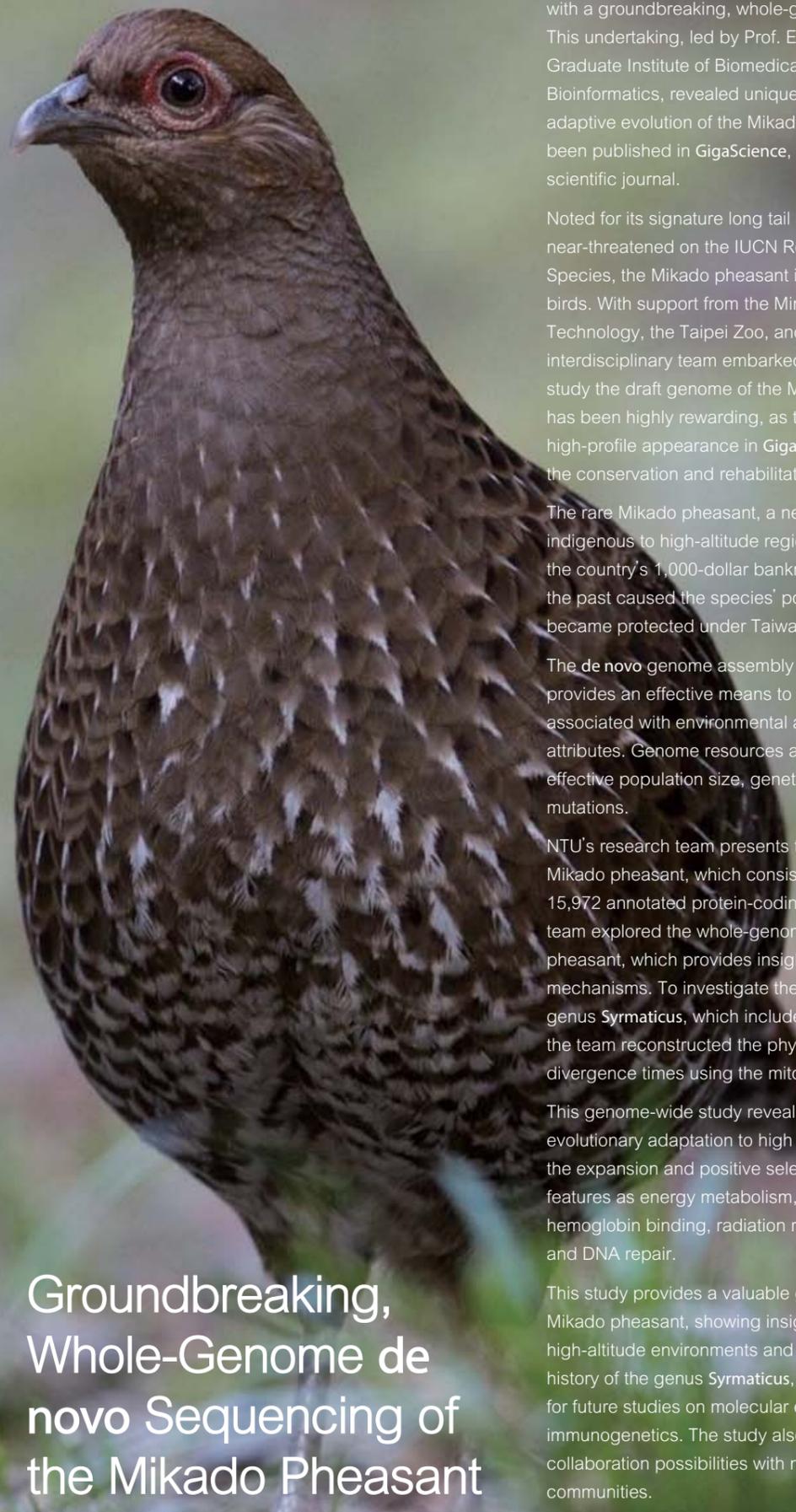
Dr. Vandana Shiva, one of the greatest inspirations to Taiwan's ongoing campaign for eco-friendly farming, opened the conference with a talk on "Real Food vs. Fake Food." Dr. Shiva is a vital intellectual leader on gender issues and seed sovereignty. Notably, she was named an environmental "hero" by Time magazine in 2003.

The conference also featured many renowned speakers on food production and environmental ethics. Prof. Poul Holm, the awardee of the European Research Council (ERC) 2017 Champion of EU research, has published on fisheries and marine environmental history. His presentation, titled "Food from the Oceans — Is There a Sustainable Future for Seafood?" truly hit home as marine resources are rapidly being depleted by overfishing globally. The conference closed with a keynote presentation on "Facing Climate Change: Changing Hearts and Minds" by Prof. Kirill Thompson, a philosopher and advocate for the "humanities for the environment" project (HfE.org).

It is hoped that the conference will be a catalyst for civic leaders and agricultural experts to join hands and address climate-driven risks threatening food production, identify effective solutions, and formulate result-centric policy agendas as a community for the public sphere.



NTU Vice President for International Affairs Luisa Shu-Ying Chang (second from right) and Director for Global Alliances Linda Chang (first from right) join Mr. Leo Van Cleve, Assistant Vice Chancellor of the CSU International Programs (first from left), for a photo.



## Groundbreaking, Whole-Genome de novo Sequencing of the Mikado Pheasant

NTU again impressed the international science community with a groundbreaking, whole-genome sequencing project. This undertaking, led by Prof. Eric Y. Chuang with the Graduate Institute of Biomedical Electronics and Bioinformatics, revealed unique genes that contribute to the adaptive evolution of the Mikado pheasant. This study has been published in *GigaScience*, a prestigious peer-reviewed scientific journal.

Noted for its signature long tail and classified as near-threatened on the IUCN Red List of Threatened Species, the Mikado pheasant is one of Taiwan's most iconic birds. With support from the Ministry of Science and Technology, the Taipei Zoo, and the university, NTU's interdisciplinary team embarked on a scientific adventure to study the draft genome of the Mikado pheasant. The journey has been highly rewarding, as the team's study made a high-profile appearance in *GigaScience*, paving the way for the conservation and rehabilitation of this iconic species.

The rare Mikado pheasant, a nearly-endangered species indigenous to high-altitude regions of Taiwan, is depicted on the country's 1,000-dollar banknote. Pressure from hunting in the past caused the species' population to drop, until it became protected under Taiwan's Wildlife Conservation Act.

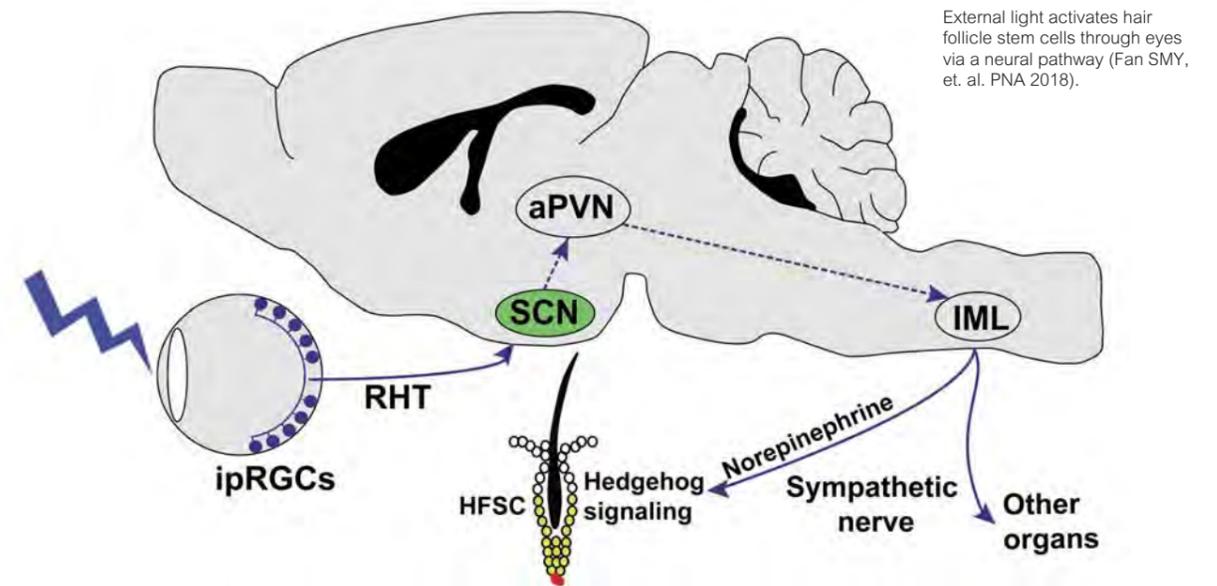
The *de novo* genome assembly of endangered species provides an effective means to identify genomic signatures associated with environmental adaptation and behavioral attributes. Genome resources also offer solid insights into effective population size, genetic defects, and deleterious mutations.

NTU's research team presents the draft genome of the Mikado pheasant, which consists of 1.04 Gb of DNA and 15,972 annotated protein-coding genes. In the study, the team explored the whole-genome assembly of the Mikado pheasant, which provides insights into the bird's adaptive mechanisms. To investigate the evolutionary history of the genus *Syrmaticus*, which includes five long-tailed pheasants, the team reconstructed the phylogeny and estimated the divergence times using the mitochondrial genomes.

This genome-wide study reveals that the pheasant's evolutionary adaptation to high altitudes may be attributed to the expansion and positive selection of genes related to such features as energy metabolism, oxygen transport, hemoglobin binding, radiation response, immune response, and DNA repair.

This study provides a valuable genomic resource for the Mikado pheasant, showing insights into its adaptation to high-altitude environments and clarifying the evolutionary history of the genus *Syrmaticus*, which are potentially useful for future studies on molecular evolution, genomics, and immunogenetics. The study also ensures greater collaboration possibilities with noted international research communities.

A Mikado pheasant.  
Photo credit: Mr. Yu-Zhen Hsieh



External light activates hair follicle stem cells through eyes via a neural pathway (Fan SMY, et. al. PNA 2018).

## Hair Follicle Stem Cells Found Activated by Light through Eyes via a Neural Pathway

A research team, led by Prof. Sung-Jan Lin of the Department of Biomedical Engineering and Associate Prof. Shih-Kuo Chen of the Department of Life Science at NTU, has found that external light can activate hair follicle stem cells and induce new hair growth after stimulating the sympathetic nerves. This study, titled "External Light Activates Hair follicle Stem Cells through Eyes via an ipRGC—SCN—Sympathetic Neural Pathway," was published in the *Proceedings of the National Academy of Sciences* on June 29, 2018.

For many animals, hair is the first line of defense for the skin. When the amount of daily sunlight changes with the seasons, animal hair growth is affected. Hair follicle stem cells have no contact with light but can feel changes in the meganiche through a certain mechanism. Stem cells in the body are subject to partial micro-environment and whole-body control, and then either stay static or are activated. How the cells and the external environment, separate and without contact, interact with one another is the main concern of this study.

This study found that if mice are exposed to intense light (especially blue light) for a few minutes every day, their hair follicles are activated and new hair grows. This physiological reaction uses the intrinsically photosensitive retinal ganglion cells (ipRGCs) as the receptors and sends signals to the suprachiasmatic nucleus (SCN). Afterwards, the whole-body sympathetic nerves are activated, leading to an increase in the release of norepinephrine in the skin, facilitating the

activation of the hedgehog signaling pathway, and then activating the hair follicle stem cells. This reaction does not affect the existing circadian physiological cycle.

Combining expertise of different fields and experimentation methods to illustrate this particular physiological mechanism, the study reveals the function of the ipRGCs regulating the autonomic nervous system. It also presents the possibility that the eyes and the brain region controlling the physiological clock have multiple nerve circuits to control various physiological functions. This breakthrough will provide new directions for research related to the use of external light to control internal physiological phenomena and stem cell activity.

The study was supported by NTU, Ministry of Science and Technology, and the Taiwan Foundation for the Development of Biomedical Technology. The first and second authors of the paper are Sabrina Mai-Yi Fan, a postdoctoral researcher at NTU, and Yi-Ting Chang, a graduate of the Department of Life Science who is currently pursuing a doctorate at Johns Hopkins University.



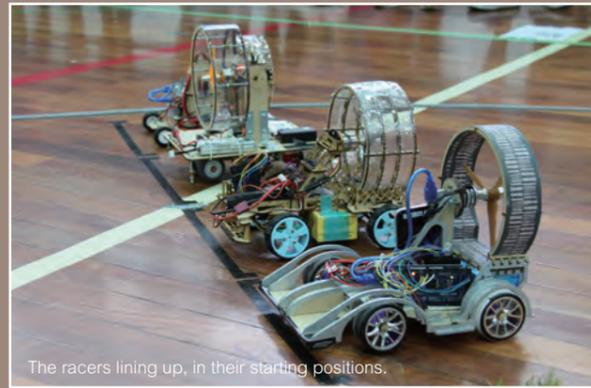
Research team members: (From left) Associate Prof. Wen-Pin Chen, College of Medicine's Department and Graduate Institute of Pharmacology; Associate Prof. Shih-Kuo Chen, Department of Life Science; Dr. Sabrina Mai-Yi Fan, first author and a graduate of the Department of Biomedical Engineering; Prof. Sung-Jan Lin, Department of Biomedical Engineering; and Assistant Prof. Ming-Kai Pan, Department of Medical Research at NTU Hospital.

# End-of-Semester Auto Racing at Mechanical Engineering Practicum Puts Teamwork to the Test

The NTU Gymnasium rumbled with excited shouts and cheers. A closer look at the ruckus revealed a group of students, all with a laser-sharp focus on their individual end-of-semester projects — miniature, propeller-powered racers — whooshing around the track. The intensity of the competition was comparable to that of a Formula One event!

This unusual-yet-memorable race marked a wonderful conclusion to "Practice of Mechanical Engineering," a practicum designed by the Department of Mechanical Engineering for its juniors, who were tasked to create racers powered by propeller-blades. These racers, aptly titled "Formula Air," inspired students to apply the mechanical engineering methods they had learned in class as they divided into teams, formulated plans and assembled miniature racecars from scratch.

The practicum module, taught by a team of six professors, took place in three classes. Prof. Kuei-Yuan Chan noted that this practicum unit serves as a Capstone Course, a term derived from the culmination of an integrative learning experience offered by a higher education program. The idea of capstone project started gaining currency in the 1990s in the United States, with a goal of deepening student outcomes and employability in undergraduate studies. That said, juniors in the Department had to integrate and apply what they had learned during the previous three years, putting their



The racers lining up, in their starting positions.

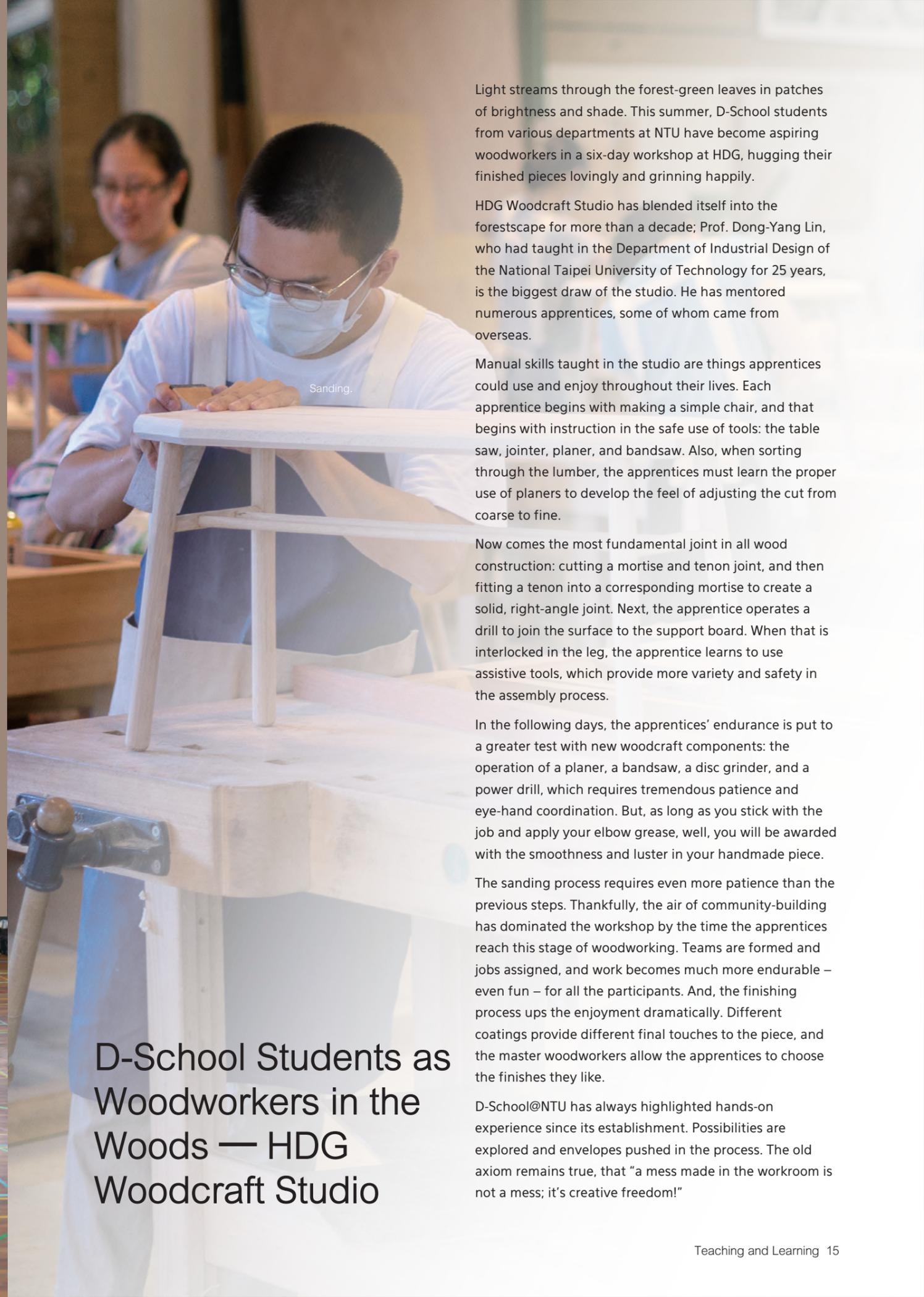
imagination and creativity to good use while ensuring successful teamwork.

The outcomes of the races were just one of the criteria on which the participants were judged. Prof. Chan said the design and production process of the racecars was given more weight during the performance evaluation. Participants were asked to create posters for their presentations that detailed the development, principles, analysis, and synthesis of their racecars. Furthermore, the racecars had to travel past the checkpoints on designated, purpose-built tracks. They had to return to the previous checkpoint if they had missed it along the way. The overall finishing time was noted in the performance evaluation, as well. Most importantly, the project cost had to be budgeted within TWD 3,000.

Participants unanimously identified the design and development of scale models for the racers from scratch as the greatest challenge. The follow-up design improvements, though labor-intensive, could be done with the scale model in place. Participants acknowledged that the speed bumps they experienced during the journey could be frustrating but concluded that they had benefited tremendously from the hands-on discovery, collaboration, awareness of contemporary issues in engineering practice, and project-based learning offered by the course.



A post-race group photo following the Formula Air competition.



Light streams through the forest-green leaves in patches of brightness and shade. This summer, D-School students from various departments at NTU have become aspiring woodworkers in a six-day workshop at HDG, hugging their finished pieces lovingly and grinning happily.

HDG Woodcraft Studio has blended itself into the forestscape for more than a decade; Prof. Dong-Yang Lin, who had taught in the Department of Industrial Design of the National Taipei University of Technology for 25 years, is the biggest draw of the studio. He has mentored numerous apprentices, some of whom came from overseas.

Manual skills taught in the studio are things apprentices could use and enjoy throughout their lives. Each apprentice begins with making a simple chair, and that begins with instruction in the safe use of tools: the table saw, jointer, planer, and bandsaw. Also, when sorting through the lumber, the apprentices must learn the proper use of planers to develop the feel of adjusting the cut from coarse to fine.

Now comes the most fundamental joint in all wood construction: cutting a mortise and tenon joint, and then fitting a tenon into a corresponding mortise to create a solid, right-angle joint. Next, the apprentice operates a drill to join the surface to the support board. When that is interlocked in the leg, the apprentice learns to use assistive tools, which provide more variety and safety in the assembly process.

In the following days, the apprentices' endurance is put to a greater test with new woodcraft components: the operation of a planer, a bandsaw, a disc grinder, and a power drill, which requires tremendous patience and eye-hand coordination. But, as long as you stick with the job and apply your elbow grease, well, you will be awarded with the smoothness and luster in your handmade piece.

The sanding process requires even more patience than the previous steps. Thankfully, the air of community-building has dominated the workshop by the time the apprentices reach this stage of woodworking. Teams are formed and jobs assigned, and work becomes much more endurable – even fun – for all the participants. And, the finishing process ups the enjoyment dramatically. Different coatings provide different final touches to the piece, and the master woodworkers allow the apprentices to choose the finishes they like.

D-School@NTU has always highlighted hands-on experience since its establishment. Possibilities are explored and envelopes pushed in the process. The old axiom remains true, that "a mess made in the workroom is not a mess; it's creative freedom!"

## D-School Students as Woodworkers in the Woods — HDG Woodcraft Studio



Group photo.

## A New Milestone for NTU's College of Bioresources and Agriculture Academic Collaboration with Kyoto University's Graduate School of Agriculture

To expand the academic exchanges and cooperation with the Graduate School of Agriculture at Kyoto University (GSAKU), Dean Huu-Sheng Lur of NTU's College of Bioresources and Agriculture (CBA-NTU), along with five other faculty members of the college, visited GSAKU during March 27-29. They held talks and joined the signing ceremony to inaugurate the Master Double Degree Program (DDP) between GASKU and CBA-NTU. The signing ceremony set a new milestone for the academic interactions between two institutions, which formally commenced during the Agricultural Deans Meeting held in 2012.

CBA-NTU and GSAKU are long-term academic partners and enjoy close relations and conduct numerous collaborative projects. Since 2012, they have had many popular academic exchanges and activities, including long-distance courses, student exchange programs, overseas offices at each other's

institutions, and lab visits between faculty members. The master DDP was established this past March after extensive discussions between the two institutions. The master DDP is a research-oriented program that offers students a full-immersion international experience with the guidance of their overseas supervisors. The students and their supervisors will have the opportunity to serve as bridge-builders for the two organizations.

The DDP is a three-year master program. After nomination and acceptance, the DDP students will first study at their home university for one and a half years, followed by another year of learning at the host university. They will then finish their first thesis and oral defense at the host university and next return to their home university to complete their second thesis in the final semester. The master DDP agreement will serve as a useful checklist for the DDP students to arrange their individual study and research programs. With guidance of two supervisors, one at GSAKU and the other at CBA-NTU, the students will be able to plan and concentrate on their studies and meet the graduation requirements of the two institutions.

During the visit, GSAKU's former Dean Hisashi Miyagawa, current Dean Eiji Nawata, and four other faculty members welcomed the CBA-NTU delegates at a warm and hearty reception. CBA-NTU's former Dean Yuan-Tay Shyu was also invited in appreciation of his contributions to the bilateral partnership. Two new graduate recruits from GSAKU were selected in April and will commence their studies at CBA-NTU in September 2019. CBA-NTU will also recommend exchange students from CBA-NTU to study at GSAKU by June 2019. This exchange program promises to be beneficial for students and faculty members alike with exposure to cutting-edge advanced knowledge and expertise.

## NTU Celebrates Inauguration of the Agricultural Incubation and Promotion Center on Yunlin Campus

The "Chuhe Building," or the Agricultural Incubation and Promotion Center on NTU Yunlin Campus, was officially inaugurated on July 18. The inauguration ceremony was attended by Council of Agriculture (COA) Minister Tsung-Hsien Lin, former COA Minister Bao-Ji Chen, COA Department of Science and Technology Director Shyh-Shyan Wang, and Magistrate of Yunlin County Chin-Yung Lee. NTU faculty members, students, and academics in attendance included NTU Interim President Tei-Wei Kuo, Executive Vice Presidents Ching-Ray Chang and Shu-Hsing Li, NTU Hospital Yunlin Branch Superintendent Juey-Jen Hwang, and Dean of the College of Bioresources and Agriculture (CBA-NTU) Huu-Sheng Lur. Interim President Kuo stressed that the Center will be used as the venue for large-scale displays, various education and training events, and the exhibition and marketing of research results. It will also serve as a model for advanced agricultural technology research.

Yunlin County Council approved the use of 54 hectares of land near the Taiwan High Speed Rail Yunlin Station Special Zone, free of charge, to NTU for the establishment of an NTU Hospital-affiliated hospital in Huwei, Yunlin. This major decision was not only in keeping with the overall policy agenda of NTU, it also promises to meet the medical needs of the people of Yunlin County. CBA-NTU planned the establishment of the Agricultural Incubation and Promotion Center to encourage extensive academia-industry collaboration. The Center had a set-up budget of around NTD 55 million, and was funded jointly by the COA, Yunlin County Government, and CBA-NTU. The building of the Center was entrusted to the Experimental Forest Administration of CBA-NTU.



A snapshot of the interior of the building.

CBA-NTU Dean Lur affirmed that the Center would be dedicated to the development of innovative agricultural technology and the promotion of environmental/ecological education and incubation programs. In other words, the Center would be responsible for innovating, adding value to, and upgrading agricultural services in Yunlin. To that end, NTU's Experimental Forest Administration, Experimental Farm, faculty members of the Research Center for Plant Medicine, the Committee of Agricultural Extension, and other units have begun planning a new agriculture joint service platform to facilitate the development of local agricultural endeavors. Moreover, a series of in-service courses offered in Yunlin, a major agricultural area, has been arranged to nurture local agricultural talent and introduce industry-academia-research cooperation initiatives for the county.



A group photo taken in front of NTU's Agricultural Incubation and Promotion Center on Yunlin Campus.

Awardees, award presenters, and members on the Preparatory Committee pose for a group photo.



## Past and Present Awardees Meet at the 20th Anniversary of NTU Literature Award Forum and Exhibition

The NTU Literature Award has experienced sporadic disruptions since its launch in 1979. In 1985, the “NTU Literary Creation Award” event became an annual activity and subsequently adopted its current name. This year marks the 20th uninterrupted anniversary of the award with a ceremony, a forum, and an exhibition.

The award presentation ceremony was held on June 7 in the Conference Hall of the Department of Chinese Literature. Executive Vice President for Administrative Affairs Ching-Ray Chang, along with then Vice President for Academic Affairs Hung-Chi Kuo, Dean of Liberal Arts Mu-Hsuan Huang, and Department Chair Chia-Ling Mei graced the occasion and offered their heartfelt commendation for the winners.

A total of 271 literary pieces, ranging from novels, essays, poems, to plays, were received; 31 of them were penned by aspiring writers from the Colleges of Liberal Arts, Social Sciences, Medicine, Science, Law, and others.

Prof. Chia-Ling Mei encouraged the award-winners to reach for the sky and emulate the example set by some of NTU’s distinguished alumni writers, including Zhen Jian, Spencer Tsai, and Ng Kim Chew, to open up new literary frontiers for Taiwan. Prof. Chang took it a step further, calling “thought”

the core of higher learning that must be nurtured through literary expression. With that goal in mind, the NTU Literature Award should be continued and solidified as the benchmark of Taiwan’s literature community.

The ceremony was followed by a forum in the afternoon, graced by the presence of five former winners, and chaired by Prof. Shu-Ling Horng, a past awardee. The atmosphere of the forum was celebratory as attendees scribbled down their answers to questions about the “faces and places” of their college years. Their answers might vary, but all agreed that — life is not what you write, but how you write it, to make it a worthy adventure.

“The Special Exhibition for the 20th Anniversary of NTU Literature Award” was held during June 7-30, highlighting a roster of awardees and an oeuvre of their works, selecting 101 volumes of fine literary writings for display. Contained in the exhibition were lovingly-penned extracts and unforgettable passages shared by the authors, paying homage to the art of storytelling so that the brilliance of the writers’ mind can be broadly enjoyed.



Group photo at the opening ceremony: (From left) Bo-Ching Chen, Prof. Chia-Ling Mei, Prof. Long-Shien Lee, Zhen Jian, Spencer Tsai, Ng Kim Chew, Yu-Hsiang Hao, Prof. Shu-Ling Horng, and Prof. Chia-Cian Ko.



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