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- Dark Energy Unveiled
- Mapping the Future of Optimal Aging

Chasing Dreams at Full Speed

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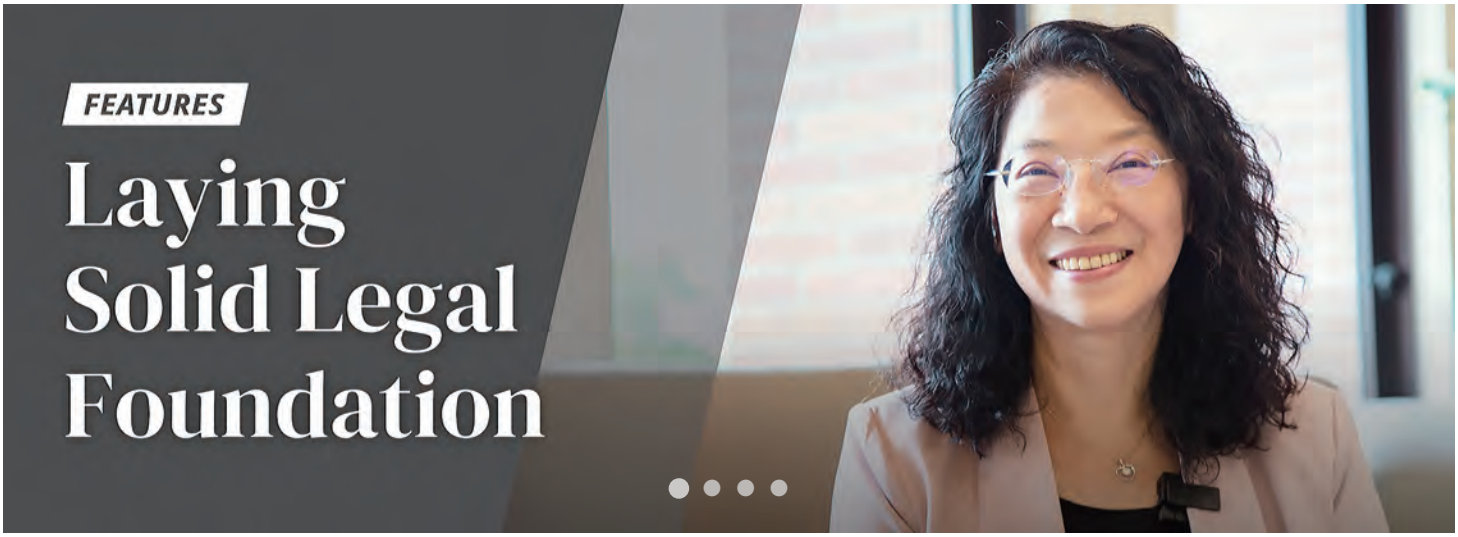

FEATURES

Prof. Huang-Yu Wang, VP for Office of Legal Affairs:
Ensuring Lawful Operations and Laying a Solid Legal Foundation

NTU set up the Office of Legal Affairs in 2019 as the first university-level office dedicated to legal affairs among all colleges and universities in Taiwan. A dedicated team of legal counsels were hired to solve legal issues related to university affairs and provide legal advice, such as review contracts and related documents, act as the agent ad litem, maintain university property and the NTU trademark, solve labor disputes, and ensure the legal force of construction procurement contracts.

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HONOR

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Global High School Exchange Forum: Experiencing the World-Class Campus

The Office of International Affairs welcomed 32 principals and counselors from 24 overseas high schools to participate in an exchange forum this summer. The guests came from Indonesia, Japan, Macau, Malaysia, South Korea, the Philippines, Thailand and Vietnam.

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Unveiling the Molecular Mechanism of Cardiac Sarcomere Assembly: New Hope for the Treatment of Cardiomyopathy

It has been found that a mutation of the sarcomeric proteins causes an abnormality in sarcomere assembly that induces cardiomyopathy. Composed of hundreds of sarcomeric proteins, sarcomere is the fundamental functional unit of heart muscle. The mechanism of sarcomere assembly in the early stages of heart development remains

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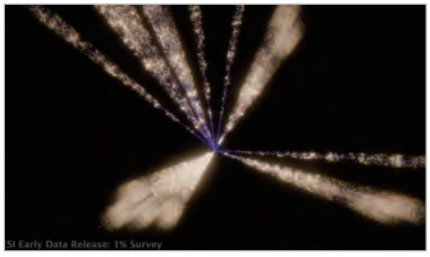

Secrets of Dark Energy: DESI Project Unveils Cosmic Mysteries

Over the span of three decades, astronomers have made a profound discovery about the universe: its expansion not only persists but is accelerating, defying explanation through the laws of known physics. This phenomenon is termed "Dark Energy," and is one of the greatest mysteries of the cosmos in modern science. To learn more about

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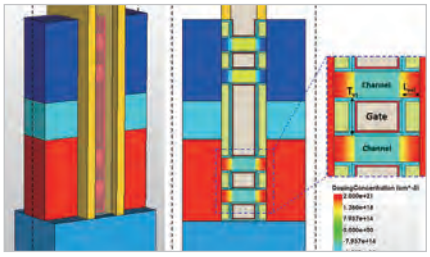

Advancing Memory Technology: Energy-Efficient CFET-based 8T SRAM

As data-centric applications, such as high-performance computing (HPC) and artificial intelligence (AI), continue to shape cutting-edge technologies, the demand for high energy efficiency becomes paramount. Such applications rely heavily on high-capacity embedded static random-access memory (SRAM) arrays that operate at low

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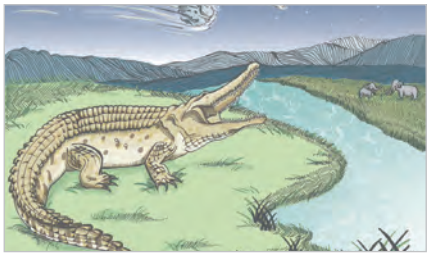

Introducing Taiwan's Largest Reptile Fossil— 'The Crocodile Princess'

Associate Prof. Cheng-Hsiu Tsai of the Department of the Life Science and his graduate student Yi-Yang Cho of the Institute of Ecology and Evolutionary Biology at National Taiwan University made a significant discovery after four years of meticulous research. They identified Taiwan's largest known reptile fossil,*Toyotamaphimeia*

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TEACHING & LEARNING

Opening up a New World of Daydreams with D-School

This year, D-School D-DAY-- an end-of-semester sharing session, drew nearly 500 participants. Themed "D-DAYDREAMER," the event attracted people to realize their dreams and ignited a spark in everyone's heart.
The band that performed at the university's commencement ceremony was invited to play at the opening ceremony of D-School D-Day, drawing an

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PEOPLE

Visually Impaired Student Wins President's Education Award

Pei-Gen Wang is a student in NTU's Department of Social Work. His name means "nourishing the root," and he has been nurturing himself with optimism, positivity, and self-confidence to grow into a giant tree to shelter

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Chasing Dreams at Full Speed: NTU Racing Unveils Epsilon 4

Buckle up and rev up your engine for a ride of a lifetime! NTU Racing, a car racing team, driven by the passion of brilliant ensemble of NTU students from various departments, pulled off the ultimate car unveiling event in July.

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Table Tennis Team: Journey of Friendship and Glory

The NTU table tennis team, led by Prof. Hsin-Fu Lin and Instructor Yi-Chieh Chen, features student talents who are passionate about this sport. Hailing from a diversity of academic

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Weaving Narratives, Building Community: Indigenous Students Forge Unity

Since 2022, the NTU Indigenous Students Resource Center (ISRC) has been hosting an enticing event: "Good Food, Good Things." This

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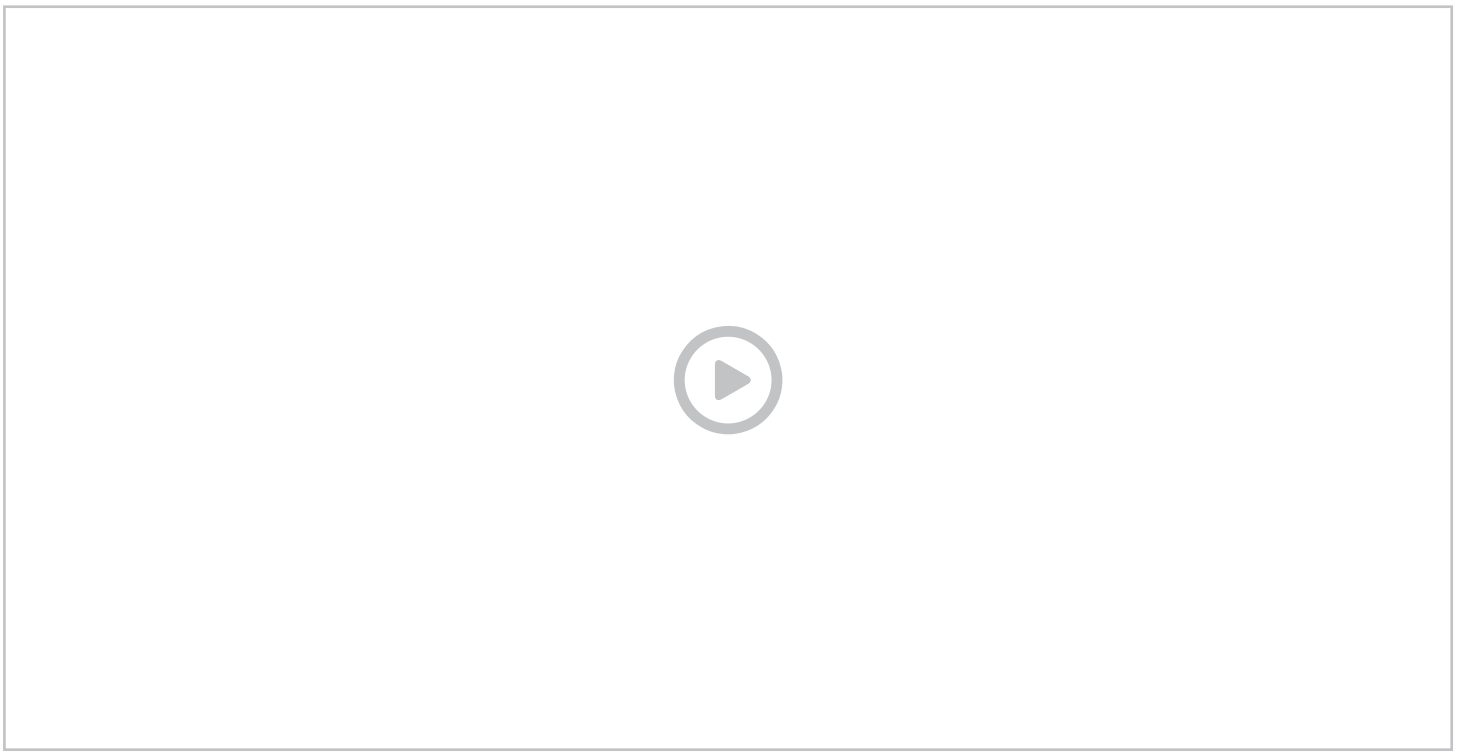
Features

Prof. Huang-Yu Wang, VP for Office of Legal Affairs: Ensuring Lawful Operations and Laying a Solid Legal Foundation



Intro Video of Prof. Huang-Yu Wang, Vice President for Office of Legal Affairs.

NTU set up the Office of Legal Affairs in 2019 as the first university-level office dedicated to legal affairs among all colleges and universities in Taiwan. A dedicated team of legal counsels were hired to solve legal issues related to university affairs and provide legal advice, such as review contracts and related documents, act as the agent ad litem, maintain university property and the NTU trademark, solve labor disputes, and ensure the legal force of construction procurement contracts.

The missions of the Office of Legal Affairs include furthering legal compliance and overseeing the lawfulness of university affairs. The Office not only provides legal consultations for university employees regarding their day-to-day duties, it also engages in raising awareness of relevant laws and regulations for different departments — to ensure the concept of the rule of law is instilled among university faculty and employees. In the meantime, the Office regularly organizes internal education and training sessions to enhance the degree of legal

Prof. Huang-Yu Wang is the Vice President for Office of Legal Affairs as well as the Dean of the College of Law. Her research focuses on criminal law, criminology, criminal policy, drug-related crime, medical law, aboriginal crime, and the comparative study of criminal law in Germany and Taiwan.

professionalism in the context of higher education. In recent years, NTU has attached great importance to cases involving academic ethics and gender equality on campus. During its investigations, the Office upholds substantive due process by ensuring the investigation and deliberation comply with the law and legal procedures, as well as strengthening the awareness of respecting the laws in everyone involved.

Additionally, the tasks of the Office include unifying the legal terms used throughout the university. In the past, wording that was ambiguous, inconsistent, or did not follow the legal language was commonplace in university regulations. Since the foundation of the Office, however, standards have been formulated for reviewing NTU regulations on which the revision of existing regulations will be based. The Office also assists all units in drafting new regulations so that the wording of various policies and regulations remains clear and consistent so as to continuously improve NTU's internal legal system.

Overall, the Office of Legal Affairs has brought many benefits to NTU. With the support of a team of legal counsels, NTU has been able to tackle legal challenges in a timely manner and ensure lawful operations of campus affairs. The Office will

Prof. Wang will continue to further legal compliance and oversee the lawfulness of university affairs, as well as improve the level of legal professionalism in the context of higher education with hopes of improving NTU's internal legal system.

Click or Scan the QR code to visit the site of the Office of Legal Affairs.

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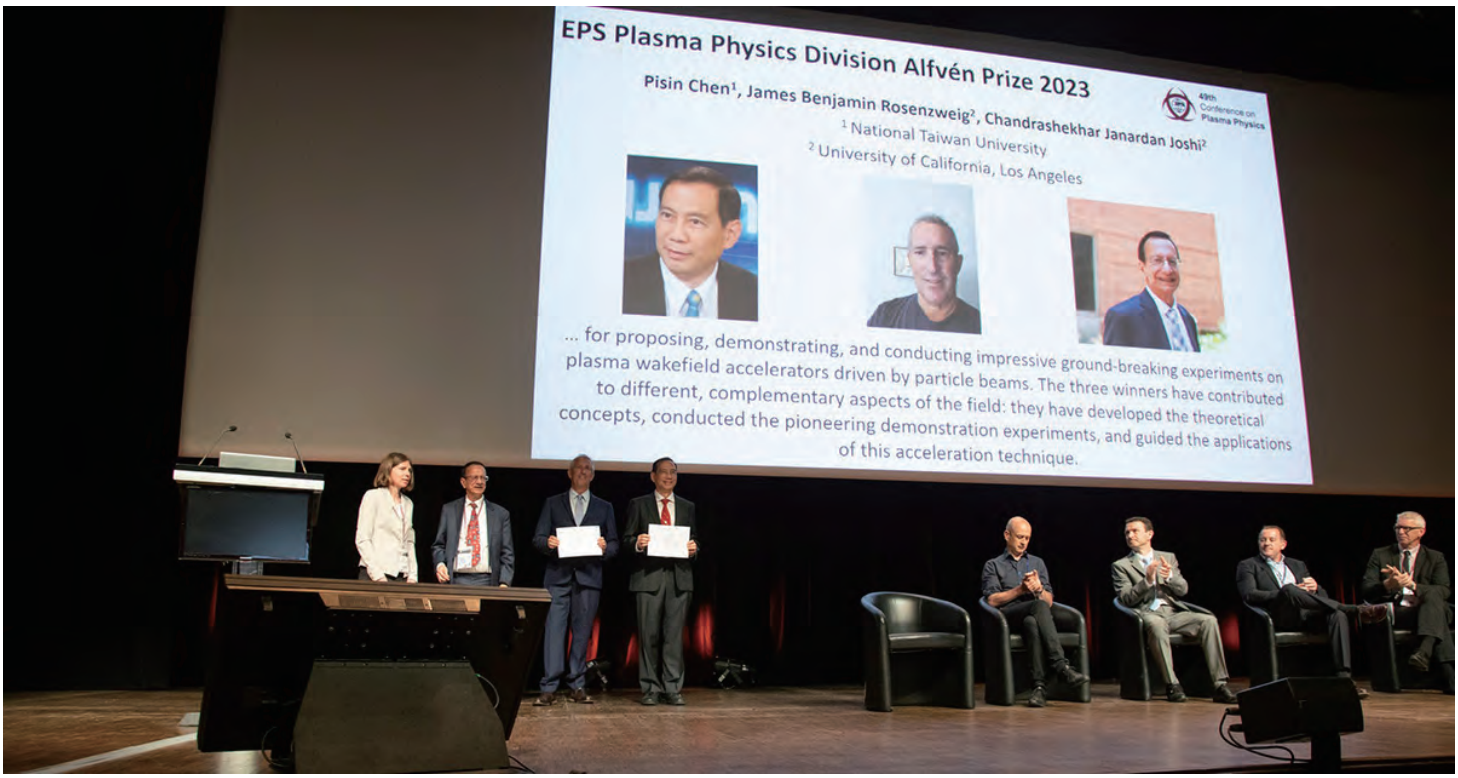
HONOR

2023 European Physical Society Hannes Alfven Prize Bestowed on Prof. Pisin Chen



The award ceremony for the 2023 Hannes Alfvén Prize by the European Physical Society Division of Plasma Physics (EPS-DPP) in Bordeaux, France on July 3, presided over by Prof. Kristel Crombe (first left), Chair of the Plasma Physics Division of the European Physical Society.

The 2023 Hannes Alfvén Prize, awarded by the European Physical Society Division of Plasma Physics (EPS-DPP), has been jointly presented to Professors Pisin Chen of National Taiwan University and Jamie Rosenzweig and Chandrashekhar Joshi of UCLA in Bordeaux, France. This prestigious prize was awarded in recognition of their exceptional contributions in proposing, demonstrating, and conducting groundbreaking experiments on plasma wakefield accelerator (PWFA) driven by particle beams. The recipients have made significant advancements in various areas of the field, including the invention, the development of theoretical concepts, the design and execution of pioneering demonstration experiments, and the guidance of applications for this acceleration technique. Prof. Pisin Chen graciously accepted the prize and delivered a speech during the ceremony.

Prof. Pisin Chen is the NTU Chee-Chun Leung Distinguished Chair Professor of Cosmology and the Founding Director of Leung Center for Cosmology and Particle Astrophysics (LeCosPA). He is also the Distinguished Chair Professor of the

Physics Department. This is yet one more recognition of Prof. Chen's exceptional scientific contributions after his receiving the Blaise Pascal Chair bestowed by the Government of Ile de France in 2018.

The citation of Prof. Chen's accomplishments states: "Prof. Pisin Chen is regarded as the inventor of PWFA and played a key role in the theoretical development of the plasma wakefield accelerator principle, energy transfer and beam loading, and plasma lenses at the SLAC National Accelerator Laboratory in the 1980s. The extreme gradients and energy gains obtainable from PWFA was a pathbreaking innovation at the energy frontier, and the extreme focusing with plasma lenses was a pathbreaking innovation at the luminosity frontier. He led an experiment at SLAC that successfully demonstrated the plasma lens principle as predicted."

Prof. Pisin Chen, Chee-Chun Leung Distinguished Chair Professor of Cosmology and Director of Leung Center for Cosmology and Particle Astrophysics (LeCosPA), delivers the first speech after the award was presented for his conception of plasma wakefield accelerator (PWFA) driven by particle beams and the theoretical foundation.

Click or Scan the QR code to visit the homepage of Plasma Physics Division of the European Physical Society.

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HONOR

Mapping the Future of Optimal Aging: NTU Team Wins Oxford Social Innovation

In addition to workshops and experiences during the final round of competition, finalists were also treated to a dinner at the University of Oxford Museum of Natural History. Photo courtesy of Saïd Business School, University of Oxford.

Already on the precipice of super-aged society status, Taiwan is on the leading edge of a challenging global trend. This year's University of Oxford Map the System competition was just the latest example of that growing interest, awarding NTU undergraduates Yu-Chun Lin, Joyce Fu, and Julia Lin third prize at the global finals this July.

NTU's final presentation archived live stream.

Hosted by the Saïd Business School and the Skoll Centre for Social Entrepreneurship, Map the System is unique among social innovation challenges. It pushes back against the stereotype of the social entrepreneur as a solitary "hero" wielding a singular, transformative solution that will "fix" everything. Instead,

the competition rewards teams that deeply explore both the full complexity of the challenge and the landscape of existing solutions to identify "impact gaps," those places where new innovation is most needed and likely to be successful. In other words, participants are discouraged from "reinventing the wheel."

Having emerged as one of 17 finalists from a semi-final in May, the NTU team travelled to Oxford in July where they spent the week leading up to the competition immersed in workshops and activities designed to deepen their skills as social entrepreneurs. "We learned a lot. Even though it was a competition, we felt connected to the other teams through shared values and commitment to create a better world," recalled Julia and Yu-Chun.

Yu-Chun Lin (Right) and Julia Lin (Left) presenting their talk at Map the System 2023 Global Finals at Oxford, 3 July 2023. Photo courtesy of Saïd Business School, University of Oxford.

While many of the teams in the finals included graduate students and those with real-life startup experience, the NTU team's project stood apart thanks to some unexpected insights developed through tireless consultation with system stakeholders. One such insight was into the Confucian value of filial piety. The team identified that it can lead seniors to internalize feelings of uselessness, triggering a vicious cycle of social withdrawal and declining mental and physical health. Framing this as a feedback loop, the team made a complex issue readily accessible to a wider audience and stimulated the judges' interest.

39 schools competed in Map the System 2023. National Taiwan University took 3rd place. Photo courtesy of Saïd Business School, University of Oxford.

When asked to give advice to future Map the System participants, Julia, Joyce, and Yu-Chun stressed several keys to success:

The first is to select the right topic, striking a balance among universal relevance, personal motivation, and the need to give priority to historically marginalized populations. Were they to start the competition anew, the NTU team said they would focus in on the intersecting challenges faced by rural-elderly populations—a group that often has the fewest resources and yet faces the highest hurdles in achieving optimal aging.

From left, Skoll Centre Director, Peter Drobac, presents Julia Lin, Joyce Fu (On Mobile), and Yu-Chun Lin with their award for third prize. Photo courtesy of Saïd Business School, University of Oxford.

Secondly, future teams should seek to collaborate with NTU faculty members, selecting at least one expert in the chosen subject matter and another with experience with social innovation. The side effect of responding to Map the System's unique requirements: it's a unique opportunity to build bridges across campus.

Third, the team emphasized the importance of picking up systems thinking and mapping skills. Without being able to make sense of and organize the findings, the inquiry risks either being too simplistic or alienating stakeholders with the complexity. Joyce and Yu-Chun credited their success, in part, to an internship at systems mapping firm Omplexity and hope that in the future, more students will be able to study systems thinking at NTU.

Thanks to everyone who participated in Map the System at NTU and to Prof. Hsueh's company, SIMFO, for hosting the local competition.

But the most important key to success, they say, comes from within when teams adopt the mindset of an innovator.

"This isn't just research," they said, "you have to really want to make an impact."

Those intrigued by Map the System have the opportunity to register for a 1-credit course on "Systems Thinking and Learning Organization" this coming fall, taught by Prof. Joe Hsueh, a respected scholar, internationally renowned for his systems maps for such leading organizations as the Walton Family Foundation, Sustainable Apparel Coalition, the World Bank, and so forth.

Faculty members, college administrators, and alumni interested in collaborating to build Map the System at NTU may reach out to Prof. Joe Hsueh at joehsueh@ntu.edu.tw and mapthesystem@simfo.org.

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The JTCA Taiwanese Students Study Tour commenced in Tel Aviv, globally renowned as the "Startup Nation." The students received a warm welcome from Ambassador Ya-Ping Lee and Irit Barash, the Executive Director & Head of Delegation for the UK and Western Europe of the Jewish Agency for Israel. This platform allowed the students to gain insights into the factors and challenges that have earned Israel its esteemed reputation as the "Startup Nation."

The itinerary included visits to a diversity of innovative startups, including Unit, CYREBRO, Incredo, and PayEm. The students had the opportunity to explore Netafim, a world leader in drip irrigation technology, and learn about the unique historical communal model known as the kibbutz. The study tour also included an exploration of the thriving startup cluster in the Western Galilee, where students engaged with representatives from such pioneering ventures as SeatGeek, AgwaFarm, InZiv, and Hilma - tech for impact. The students also embarked on intriguing visits to The Hebrew University of Jerusalem, the first university co-founded by Albert Einstein, and the visionary Reichman University.

Extending beyond Tel Aviv, the tour included three other significant Jewish holy cities—Tiberias, Safed, and Jerusalem. Students were honored to experience the Jewish Sabbath and embark on jeep tours to appreciate the historical landscapes of the Golan Heights in Tiberias. In Safed, students witnessed the harmonious interplay between art and religion, and in Jerusalem they were exposed to a remarkable coexistence of diverse religions and cultures while delving into the rich historical significance of sites like the Western Wall and the City of David.

The JTCA Taiwanese Students Study Tour in Israel was a transformative journey offering the students profound knowledge and insights into Israeli innovation, culture, and history. This initiative not only broadened their horizons but also fostered stronger and enduring links between Israel and Taiwan.

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The study tour encompassed three other major Jewish holy cities, one of them was Jerusalem.

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Global High School Exchange Forum: Experiencing the World-Class Campus

NTU Global High School Exchange Forum.

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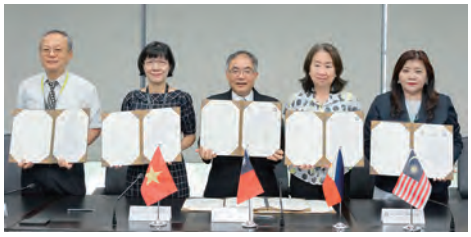

NTU Global High School Exchange Forum.

During the exchange forum, a signing ceremony between National Taiwan University, the Philippine Science High School System, Vietnam's Lawrence S. Ting School and Taipei School in Ho Chi Minh City, and Malaysia's Chinese Taipei School (Kuala Lumpur) was held at Lixian Hall. To encourage overseas student "high-achievers" to attend NTU, President of NTU Prof. Wen-Chang Chen invited these four schools to join the NTU International High School Alliance.

NTU Global High School Exchange Forum.

Prof. Shih-Torng Ding, Executive Vice President of NTU, opened the exchange forum by hosting a seminar on the Future NTU Project. The next day, several

NTUOIA units showcased their various projects, notably, the NTU Study Abroad Program and the NTU International Mentorship Program. The former program is aimed to open up new dimensions in the students' learning experience while the latter provides professional guidance for students preparing for their prospective careers. NTUCASE, Center for the Advancement of Science Education, also arranged opportunities for the guests to visit popular departments at NTU to experience their world-class teaching and research environment. The participants enjoyed the visits and this opportunity to gain first-hand experience of studying at NTU.

NTU Global High School Exchange Forum.

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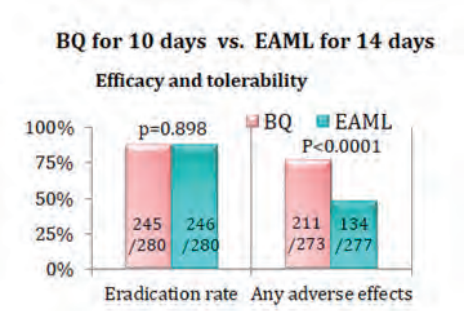
ACHIEVEMENTS

Advances in Rescue Therapies for Difficult-to-Treat H. Pylori Infections

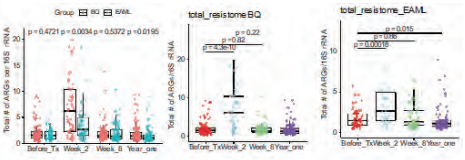
Helicobacter pylori is the principal cause of stomach cancer. National Taiwan University Hospital (NTUH) provides H. pylori screening and eradication treatment to individuals with a high-risk profile for stomach cancer. With the support of the National Science and Technology Council (NSTC) and the Ministry of Health and Welfare, several medical centers in Taiwan jointly established the "Taiwan Clinical Trial Consortium for Gastrointestinal Disease and Helicobacter," under the leadership of President Prof. Ming-Shiang Wu. The Consortium conducts clinical trials and carries out H. pylori screening. The screening results indicate that the prevalence rate of H. pylori among adults in Taiwan has decreased from 60% three decades ago to 30% at present. Among children, it has decreased further to 10%. During this period, the standardized incidence rate of stomach cancer has also declined.

In recent years, the Consortium medical team has developed highly effective first-line treatment regimens with an eradication rate of over 90%. Moreover, the team has made a dedicated effort to develop second- and third-line rescue treatment regimens for difficult-to-treat H. pylori infections. Recent research by Prof. Wu and research team members including Dr. Jyh-Ming Liou, Dr. Yi-Chia Lee, Dr. Chieh-Chang Chen, Dr. Yu-Jen Fang and Dr. Mei-Chih Chen, indicates that Bismuth quadruple therapy (BQ) and levofloxacin-based quadruple therapy (EAML) have achieved eradication rates of 93% (245/264) and 90% (246/273), respectively, as second-line H. pylori treatments. As to patients for whom the second-line eradication therapies are ineffective, another prescription is used as the rescue therapy, resulting in cumulative eradication rates of 97% (255/264) and 96% (261/273) for the two groups, respectively.

Additionally, the research team conducted long-term monitoring of the composition of the gut microbiota and the antimicrobial resistance gene profile in these patients, in collaboration with Prof. Emad El-Omar's team at the University of New South Wales. The study found that after introduction of H. pylori eradication therapy, the diversity of gut microbiota decreased temporarily. However, it recovered to a level similar to that before treatment after one year. The antimicrobial resistance gene profile significantly increased immediately after completion of eradication, but by the 8-week mark and one year later, it had returned to the pre-treatment level.



Eradication rates and side effects of Bismuth quadruple therapy (BQ) and levofloxacin-based quadruple therapy (EAML) in second-line treatment of Helicobacter pylori.



The antimicrobial resistance gene profile shows a significant increase immediately after completion of eradication, but it can recover to the pre-treatment state at both the eight-week mark and one year later.

Click or Scan the QR code to read the journal article in *The Lancet Gastroenterology and Hepatology.*

These research findings provide important insights for both domestic and international second-line and third-line rescue therapies for H. pylori. They also demonstrate that the composition of gut microbiota and the antimicrobial resistance gene profile can recover to a level similar to that before treatment after one year of eradication, providing a safety assurance when using eradication to prevent gastric cancer.

Dedicated to reducing the threat of gastric cancer in the population, NTUH actively strives to develop healthcare service technology in the post-pandemic era to clarify changes in gut microbiota after eradication and make continuous advancements for individuals, communities, and science.

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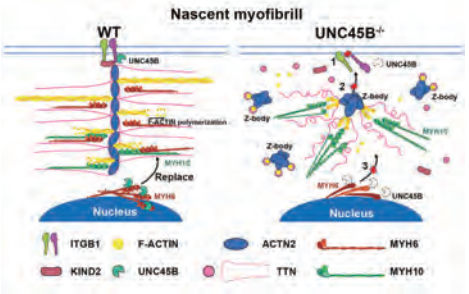
ACHIEVEMENTS

Unveiling the Molecular Mechanism of Cardiac Sarcomere Assembly: New Hope for the Treatment of Cardiomyopathy

The research team led by Associate Prof. Su-Yi Tsai, Department of Life Science, National Taiwan University.

It has been found that a mutation of the sarcomeric proteins causes an abnormality in sarcomere assembly that induces cardiomyopathy. Composed of hundreds of sarcomeric proteins, sarcomere is the fundamental functional unit of heart muscle. The mechanism of sarcomere assembly in the early stages of heart development remains unclear. Researchers must understand this mechanism in order to devise effective treatments of cardiomyopathy.

The research team led by Associate Prof. Su-Yi Tsai, Department of Life Science, National Taiwan University, developed a new system that reveals the expression of core sarcomere-related proteins in a temporal and spatial manner during the differentiation of human pluripotent stem cells into cardiomyocytes, disclosing the molecular mechanism of sarcomere assembly.



The lack of molecular chaperon UNC45B leads to issues leading protocostamere to be unable to form and myosin folding. Protocostamere is the starting point of sarcomere assembly, and the lack of molecular chaperon UNC45B results in its failure.

The research team also found that the molecular chaperon UNC45B has high-level coexpression with sarcomere marker proteins in different components of the sarcomere structure, and investigated whether UNC45B plays different roles in these different components. Notably, they found that UNC45B-deficient cardiomyocytes do not contract. However, their mechanism studies revealed that UNC45B regulates the formation of protocostamere, the starting point of sarcomere assembly, by regulating the expression of KINDLIN2. Importantly, the research team confirmed that UNC45B regulates the formation of cardiac sarcomeres by interacting with sarcomere-associated proteins in different components of the sarcormore structure in a spatiotemporal manner.

These findings are of crucial importance because expectant mothers with UNC45B mutations may give birth to babies with neonatal myofibrillar myopathy type II, which cannot survive long after birth. The findings of this study open the way to devising new treatment strategies for neonatal myofibrillar myopathy type II.

Click or Scan the QR code to visit the website of Associate Prof. Su-Yi Tsai's laboratory.

Click or Scan the QR code to read the journal article in *Stem Cell Reports*.

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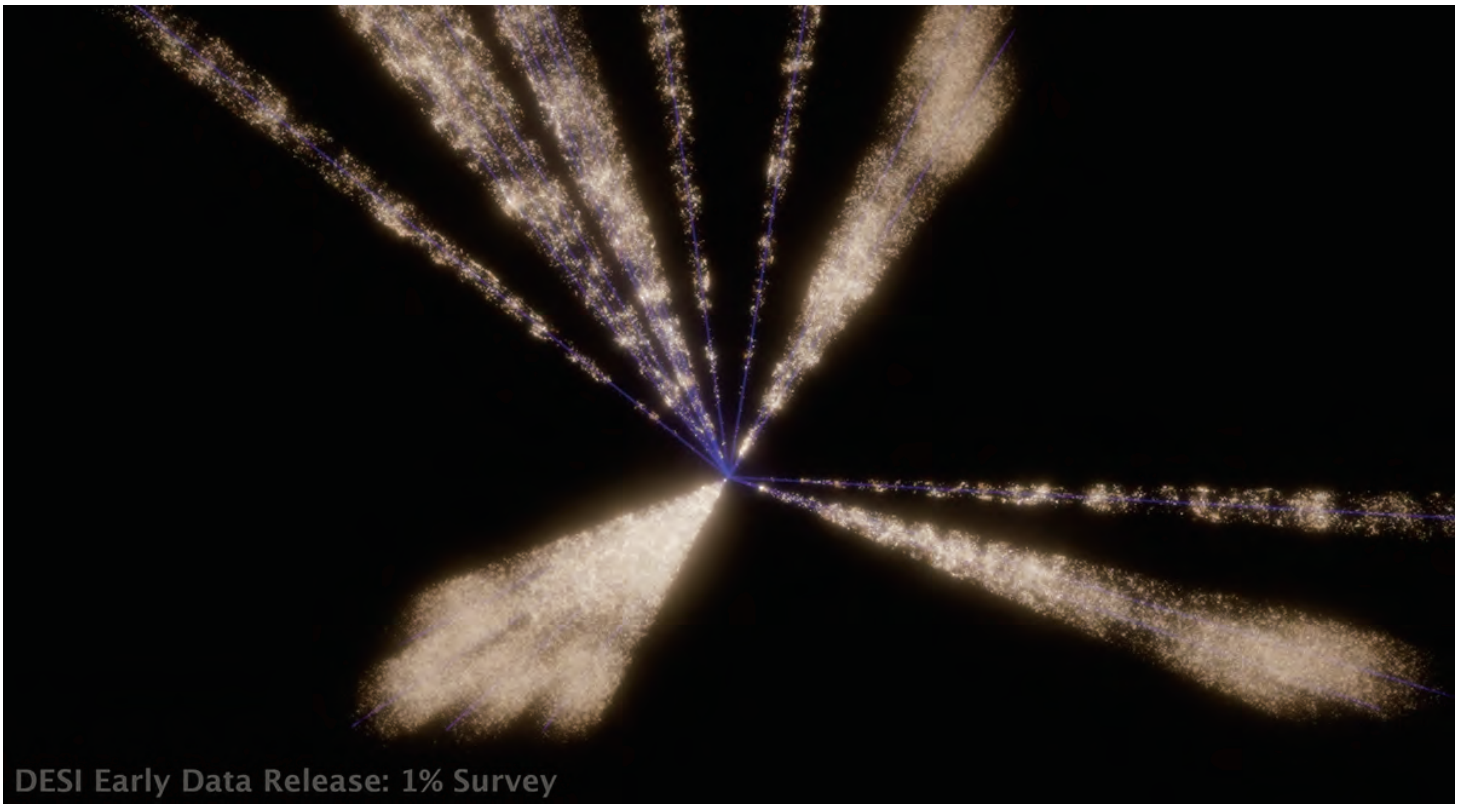
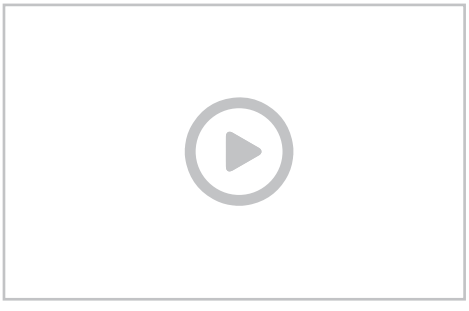
ACHIEVEMENTS

Secrets of Dark Energy: DESI Project Unveils Cosmic Mysteries



A 3D cosmic map derived from approximately 700,000 objects contained in this data release. The mapped sky area represents just 1% of the final comprehensive map to be generated by DESI. (Credit: David Kirkby / DESI collaboration)

Over the span of three decades, astronomers have made a profound discovery about the universe: its expansion not only persists but is accelerating, defying explanation through the laws of known physics. This phenomenon is termed "Dark Energy," and is one of the greatest mysteries of the cosmos in modern science. To learn more about Dark Energy, over 70 institutions worldwide, hosting hundreds of scientists and engineers, have joined hands to build the formidable Dark Energy Spectroscopic Instrument (DESI). Affixed to the monumental Nicholas U.Mayall telescope in Arizona, this advanced instrument aims to assemble the most extensive 3-D map of the universe ever unfolded, encompassing over 40 million celestial objects, from distant galaxies to supermassive black holes.



DESI planetarium introduction video. (Credit: Fiske Planetarium)

The DESI project reached a critical milestone by initiating its early data release, granting astronomers worldwide access to nearly 2 million observations. This early milestone serves as a testament to DESI's exemplary operational performance, the exceptional quality of the data collected, and its extraordinary

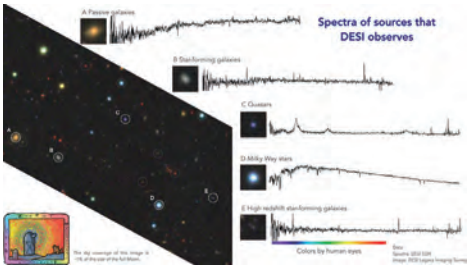
potential. Among the contributors to this landmark achievement, prominent research teams from Taiwan, spearheaded by Assistant Prof. Ting-Wen Lan of National Taiwan University and Assistant Prof. Andrew Cooper of National Tsing Hua University, have played pivotal roles. Their laudable contributions are featured in a distinguished special issue of the prestigious *Astrophysics Journal*.

DESI employs cutting-edge technology, including high-speed robots and advanced fiber-optics, equipped with 5000 tiny "eyes," enabling unprecedented examinations of the universe through the telescope's lens. Each “eye” captures a “spectrum,” dissecting light into a myriad of colors. The team then uses this spectral information to measure the distance, motion, and element composition of the individual stars and galaxies.

Under the leadership of Prof. Lan, an assembly of researchers meticulously scrutinized tens of thousands of early spectroscopic measurements, ensuring the quality of the DESI galaxy spectra. Drawing their different areas of expertise, they evaluated the new automated methods, which enable acquiring and processing a large number of high-quality spectra ever documented. Lan remarked, “We set some tough exams for DESI and it passed all of them with top marks. We’re confident that DESI is ready for its mission to reveal the secrets of Dark Energy.”

Besides illuminating the mysteries of Dark Energy, DESI dedicates a significant portion of its observations to examining over 7 million remote stars within our own Milky Way galaxy. From this unique vantage point, researchers anticipate gaining valuable insights into the evolution of our galaxy through time, while simultaneously embarking on an ambitious quest to uncover the elusive cosmic enigma of dark matter.

The remarkable progress of the DESI project is a testament to the dedication of the international scientific community in their pursuit of understanding the cosmos. This pioneering endeavor is gradually unraveling the universe's enigmas and propelling astronomical research to uncharted territories of discovery.



Example of DESI spectra. The image shows a small faction of sky in the DESI footprint with circles indicating celestial objects with DESI spectroscopic observations. Spectra of five types of sources are shown on the right from passive galaxies, star-forming galaxies, quasars, stars and distant star-forming galaxies ordered from top to bottom respectively. (Credit: Ting-Wen Lan / DESI collaboration)

Prof. Lan and Prof. Cooper and their research team members. The background image is the Mayall Telescope, where the DESI is located. (Credit: Marilyn Sargent, UC Lawrence Berkeley National Laboratory)

DESI 5000 fiber positioner construction. (Credit: Marilyn Sargent/Berkeley Lab)

Click or Scan the QR code to visit the DESI project webpage to learn more about the project.

Click or Scan the QR code to access the DESI Early Data Release page.

Click or Scan the QR code to read the journal article in *The Astrophysical Journal*.

Click or Scan the QR code to read DESI early data special issue in *The Astrophysical Journal*.

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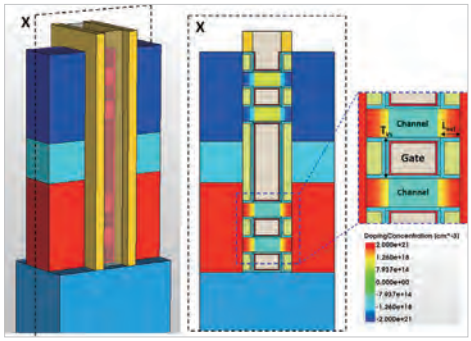
ACHIEVEMENTS

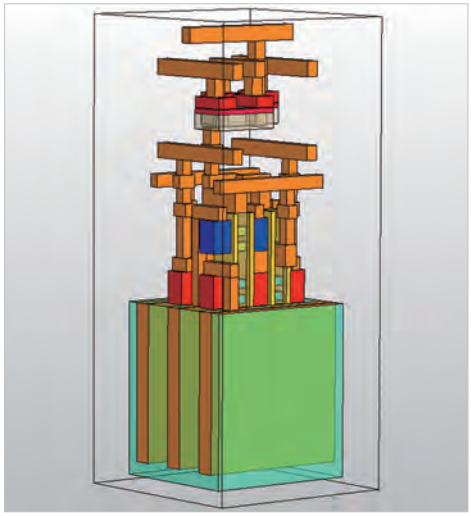
Advancing Memory Technology: Energy-Efficient CFET-based 8T SRAM

As data-centric applications, such as high-performance computing (HPC) and artificial intelligence (AI), continue to shape cutting-edge technologies, the demand for high energy efficiency becomes paramount. Such applications rely heavily on high-capacity embedded static random-access memory (SRAM) arrays that operate at low supply voltage, requiring large memory capacity and minimal SRAM cell area to boost computing capabilities. Since computing cores continually access on-chip SRAM caches, the key to making future advances in high-performance computing applications will be to enhance the density, performance, and energy efficiency of SRAM caches. Complementary Field Effect Transistor (CFET) technology, achieved by the vertical stacking of n-type and p-type transistors, has marked a significant leap in eliminating the scaling barrier and advancing SRAM density scaling. Despite the success of the 6T CFET SRAM in sustaining the scaling trend, the challenge of achieving a lower minimum operation voltage (Vmin) has been daunting due to the limitation of sharing the same read/write port.



The schematic of CFET includes two stacked nanosheets for bottom-tier n-type transistors and top-tier p-type transistors, respectively.

A research team led by Prof. Vita Pi-Ho Hu recently introduced an energy-efficient CFET-based 8T SRAM, presented at the preeminent IEEE International Electron Devices Meeting (IEDM). Their novel CFET-based 8T SRAM combines front-end-of-line (FEOL) CFET and back-end-of-line (BEOL)-compatible transistors, integrating BEOL-compatible transistors with low thermal budgets facilitates monolithic 3D integration, and opening up new horizons for System-on-Chip (SoC) scaling. The proposed CFET-based 8T SRAM offers a compelling advantage: it significantly reduces SRAM cell area as compared to the state-of-the-art Fin field-effect-transistor (FinFET) SRAM. Moreover, it eliminates read/write conflicts and enhances read stability by separating the read and write ports. This transistor strength optimization further improves write stability, eliminating the need for write assist-circuit energy overhead.

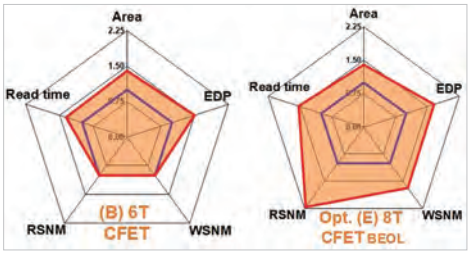


The 3D structures for the proposed CFET-based 8T SRAM.

Through meticulous design and optimization, the energy-efficient CFET-based 8T SRAM showcases remarkable advances in SRAM area scaling, speed, stability, and overall energy efficiency as compared to other CFET-based SRAMs. This optimized solution excels in every respect, opening a clear path toward energy-efficient computing for data-centric and high-throughput applications.

With its groundbreaking characteristics, the CFET-based 8T SRAM is poised to revolutionize memory technology. It offers an ideal solution for future data-centric computing needs, where performance and energy efficiency are paramount concerns.

Click or Scan the QR code to read the journal article in *IEEE Access*.



Comparisons of CFET-based 6T and 8T SRAM cells. The radar plot indicates the degree of improvements compared to 6T nanosheet (NS) SRAM (blue line in the radar plot). A larger orange area in the radar plot is better, which means more significant improvements. The proposed CFET-based 8T SRAM (opt. (E) 8T CFETBEOL) SRAM shows 2.2X and 1.7X improvements in read and write stability (RSNM and WSNM). The read time, energy-delay product (EDP) and SRAM area are improved by 53.3%, 65.7%, and 40%.

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ACHIEVEMENTS

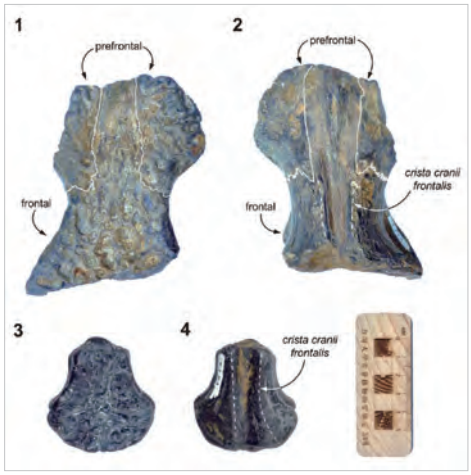
Introducing Taiwan's Largest Reptile Fossil— 'The Crocodile Princess'

Associate Prof. Cheng-Hsiu Tsai of the Department of the Life Science and his graduate student Yi-Yang Cho of the Institute of Ecology and Evolutionary Biology at National Taiwan University made a significant discovery after four years of meticulous research. They identified Taiwan's largest known reptile fossil,*Toyotamaphimeia taiwanicus*, an extinct endemic crocodilian lineage in Taiwan. Their discovery, which sheds light on an important facet of Taiwan's natural history, has been published in the *Journal of Paleontology*, a publication of the Paleontological Society.

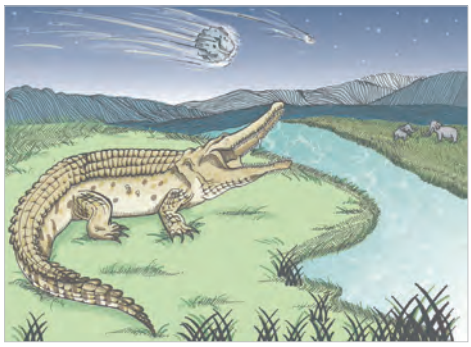
While crocodiles are seldom a focal point in Taiwan's biodiversity studies, and it was in 1972, a half century ago, that the first endemic crocodile species in Taiwan, Tomistoma taiwanicus, was christened. This extinct species, which thrived during the Pleistocene period, was discovered by Japanese paleontologist Tokio Shikama. Since the crocodile fossil specimen has been held by the National Museum of Nature and Science in Japan, the existence and significance of the Taiwan Crocodile received limited attention in Taiwan.

To delve deeper into this subject, Prof. Tsai retrieved the type specimen of *Tomistoma taiwanicus* from the National Museum of Nature and Science in Japan to conduct further research. Their examination of the type specimen revealed that the so-called *Tomistoma taiwanicus* was not a member of the *Tomistoma* genus but rather an extinct genus known as "*Toyotamaphimeia*." Interestingly, the name *Toyotamaphimeia* derives from a princess in Japanese mythology who transformed into a crocodile, reflecting that Taiwan is now home to its own "Crocodile Princess." Prof. Tsai's detailed analysis disclosed significant morphological differences between this type specimen and the only known specimen from Osaka, Japan. Consequently, the name was revised to "*Toyotamaphimeia taiwanicus*."

Through further analysis and size estimation, Prof. Tsai determined that *Toyotamaphimeia taiwanicus* could grow to 7 meters in length, making it larger than the largest known living saltwater crocodile in the world today. These findings align with Prof. Tsai's earlier research findings, which were published in *Science* earlier this year, addressing large-scale extinctions of organisms in Taiwan. The forthcoming results of his paleontological research are expected to provide valuable insights into the mystery and causes of biological extinctions in Taiwan, offering a long-term perspective for addressing climate change and the ongoing sixth mass extinction crisis.



The morphological characteristics of the type specimen of *Toyotamaphimeia taiwanicus* and some cranial features.



Reconstruction image of *Toyotamaphimeia taiwanicus* (illustrated by Mobeichi).

Click or Scan the QR code to read the journal article in *Journal of Paleontology*.

TEACHING & LEARNING

Opening up a New World of Daydreams with D-School

Opening up a New World of Day Dreams with D-School.

This year, D-School D-DAY, an end-of-semester sharing session, drew nearly 500 participants. Themed "D-DAYDREAMER," the event attracted people to realize their dreams and ignited a spark in everyone's heart.

The band that performed at the university's commencement ceremony was invited to play at the opening ceremony of D-School D-Day, drawing an impressive crowd to dance around the stage. The Trans-disciplinary Bachelor Degree Program spotlighted 25 students who had broken away from the disciplinary silos of traditional higher education to create new fields of their own, such as creativity education, long-term care for the elderly, and animal rights. The trans-disciplinary program gives students the opportunity to "explore and learn" with a high degree of flexibility and freedom. The students can take courses in any field they wish during the program. By taking advantage of every resource inside and outside the university, they can explore every possibility in pursuit of their dreams.

Petit Theatre interacted with the students.

At the venue of the Trans-disciplinary Bachelor Degree Program presentation, the participants could pick up gold coins to invest in the projects that were interesting to them. Many students in the program were on hand to share details about the process of working on their projects with the participants, while expressing their ideas through self-media campaigns and workshops to expand their influence.

Lastly, the highlight of the event was unveiled in the D-School course presentation area. The participating students marveled at such projects as Food Design and Social Innovation, Active Aging in Place: Home Culture, Design for Well-being: Redefining Health from a Multi-Dimensional Perspective, as well as a variety of cross-disciplinary courses focusing on the practical aspect of projects. The participants all took photos and notes while exclaiming, ” I really want to take this course next term!”

Click or Scan the QR code
to visit the D-School Facebook
fan page for the latest information.

Click or Scan the QR code
to visit the D-School website
for more information on the courses.

The students presented their projects to faculty members.

Group photo of students in the “Healthcare and Innovation Design” course with Vice President Shan-Chwen Chang (4th from the right).

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PEOPLE

Daring to Dream and Inspiring the Generation: The President's Education Award Goes to Pei-Gen Wang, a Visually Impaired Student

Wang and his peers ascend Matcha Mountain, St. Marian Hiking Trail, Yilan when he was a graduate student. Following a three-hour climb, Wang finally pauses to enjoy the refreshing mountain breeze – and the sense of accomplishment.

Pei-Gen Wang is a student in NTU's Department of Social Work. His name means "nourishing the root," and he has been nurturing himself with optimism, positivity, and self-confidence to grow into a giant tree to shelter and nourish others. Born into a visually-impaired family, he lost his eyesight due to retinal detachment when he was young. However, he has remained dedicated to his studies with the solid support of his family and friends. In 2010, he won his first President's Education Award as a junior high school student.

After entering NTU, Pei-Gen Wang faced the many obstacles with the confidence and courage to find his footing in this mostly-seeing society. With his expertise in social work and unique insight as a visually-challenged person, he presented two papers on disabilities at domestic seminars in 2019 as a graduate student. Moreover, he joined the Center for Student Well-Being in 2021 to assist other challenged students in overcoming their obstacles based on his own knowledge and experience.

In his application for the 2023 President's Education Award, Wang introduced his life story as "the growth narrative of a helper with disabilities and experience in social work." During the selection process, all the faculty members and student peers recommended him highly to the selection committee. They praised his sincerity and solid contributions. Ever humble, Wang expressed the wish to further explore the academic discipline of assisting people and responding to the needs of society in his academic research. By supporting and delving into topics concerning disabilities and oppression, he intends to sustain and grow his influence on social systems and culture.

Wang's receiving this award again in 2023 proves that he has the courage to tackle challenges, keep the community as well as himself in mind, and project a positive attitude. He truly embodies the spirit of this award!

The Center for Student Well-Being arranges various lectures for department students. Wang introducing a presentation at the beginning of the session.

Wang adopts a casual style at the dining table to connect with students in the department and show his concern for their daily lives.

Drawing strength from the natural environment, Wang recharges the energy he needs to face the challenges in his life with disabilities.

PEOPLE

Chasing Dreams at Full Speed: NTU Racing Unveils Epsilon 4

NTU Racing Unveils the Next-Generation Race Car.

Buckle up and rev up your engine for a ride of a lifetime! NTU Racing, a car racing team, driven by the passion of brilliant ensemble of NTU students from various departments, pulled off the ultimate car unveiling event in July. The team debuted their latest masterpiece, the all-new fourth-generation race car—the "Epsilon 4." Compared to its predecessors, the Epsilon 4 features a new battery module, lighter weight, stronger structural integrity, and an added bottom plate and anti-toll bars for increased stability. The Epsilon 4 can reach a maximum speed of 96 kilometers per hour and its outstanding performance helped NTU Racing achieve impressive results in the Formula Student Taiwan (FST) car racing tournament hosted at Lipao Racing Park.

Epsilon 4 features lighter weight, stronger structural integrity, an added bottom plate and anti-toll bars for increased stability, and a maximum speed of 96 kilometers per hour!

NTU Racing's Captain Pei-Xun Su affirms that the pandemic did not prevent the team from pursuing their goal and building Epsilon 4. Last December, the car racing team participated in Formula SAE Australasia. It was the only Taiwanese

car racing team to join the competition, and the only non-Australian team to win the PACCAR - Most Impressive Student Award.

Th Formula SAE Australasia includes dynamic and static competitions. NTU Racing made an impressive debut, earning a prestigious 5th place award in the business presentation category. Though they missed out on the dynamic competition due to a minor setback in the second round EV examination, they were undaunted and their spirits remained high.

Yearning to conquer new heights, NTU Racing has set its sights on an even grander challenge — the renowned Formula SAE Japan (FSAE-J) in 2024. Formula SAE challenges undergraduate and graduate students to conceive, design, fabricate, and compete with small formula-style racing cars, providing participants the opportunity to compete with top teams from all over the world. The competition is a platform for global teams to exchange ideas, compete, and gain exposure, driving the integration of academic knowledge and practical skills.

For NTU Racing, FSAE-J represents the ultimate proving ground, where participating student will step onto the international stage and seize the opportunity to sharpen their technical expertise, hone their skills, and help them thrive in the automotive industry. With steadfast determination and passion, NTU students are ready to turn their dreams into reality and dominate the racetracks!

Click or Scan the QR code
to visit the Instagram page of
NTU Racing to follow their latest news.

According to Prof. Kuei-Yuan Chan, who heads the Department of Mechanical Engineering and advises NTU Racing, the team primarily comprises mechanical engineering students. However, they also welcome students from a variety of disciplines, such as electrical engineering, life sciences, accounting, and history. During the past five years, the team has honed their skills and amassed valuable experience in crafting electric race cars. Yet, they also seek the ongoing support of industry and academia alike, to showcase their brilliance and thrive in this competitive dynamic field.

Executive Vice President Shih-Torng Ding (First right) emphasizes that NTU Racing's journey in constructing electric race cars and competing on the global stage reflects the University's vision to empower its students to showcase their abilities, chase their dreams, and engage with the international community, while upholding such core values as altruism. He further stresses that NTU students and faculty's practical application of problem-solving skills, their moving beyond theory and textbooks, aligns closely with the University's core values. He also expresses heartfelt appreciation to the sponsoring companies for their invaluable support for turning these dreams into reality.

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PEOPLE

Table Tennis Team: Journey of Friendship and Glory

The NTU table tennis team, led by Prof. Hsin-Fu Lin and Instructor Yi-Chieh Chen, features student talents who are passionate about this sport. Hailing from a diversity of academic departments, these talents excel not only in their studies but also show prowess at the table tennis table. Despite their diverse interests and backgrounds, they share a common objective: to sharpen their table tennis skills and win trophies and glory for their school.

During the past several decades, the NTU table tennis team has achieved noteworthy success in national competitions, compiling a truly outstanding record. They have consistently excelled in the National Intercollegiate Games and prevailed in intercollege tournaments. In the most recent National Games, they won 26 gold, 19 silver and 19 bronze medals in total. They also garnered 2 gold, 1 silver, and 2 bronze medals in the National Intercollegiate Athletic Games. The record compiled by NTU Table Team surpasses that of every other university tennis team nationwide. Their outstanding success not only receives acclaim in Taiwan, it has garnered many accolades as well as invitations to compete in exchange matches in China, where they host friendly matches with top players from different regions. These achievements not only demonstrate the team's dedication to table tennis, but bring honor to National Taiwan University.

More than just a sports team, the NTU table tennis team is a loving, tightly-knit family. The players support and learn from one another as they face challenges together and share the joy of victory. Many activities, such as orientation events, team outings, and farewell gatherings, offer respite from their demanding training routines, offering comfort and joy to offset their grueling practice sessions. Together, they travel across the nation, creating bountiful cherished memories while garnering numerous honors. Looking ahead, they will stay passionate about table tennis and keep sharpening their skills to bring honor and glory to their alma mater.

Instructor Yi-Chieh Chen (first row, center) with the NTU table tennis team at the 2023 National Intercollegiate Athletic Games.

Prof. Hsin-Fu Lin (left) with the NTU men's table tennis team at the 2022 National Intercollegiate Athletic Games.

Prof. Hsin-Fu Lin (right) with the NTU women's table tennis team at the 2023 National Intercollegiate Athletic Games.

Click or Scan the QR code to visit the Facebook page of NTU Table Tennis Varsity.

Click or Scan the QR code to check out the Instagram page of the NTU Table Tennis Varsity.

PEOPLE

Weaving Narratives, Building Community: Indigenous Students Forge Unity

Invited small-scale farmers share their experiences of indigenous vegetable farming (provided by ISRC).

Since 2022, the NTU Indigenous Students Resource Center (ISRC) has been hosting an enticing event: "Good Food, Good Things." This gathering serves as a lively platform for indigenous students meet, not just to forge bonds but also to learn from their upper classmates. In this unique space, the students begin to address each other as "brother and sister," uniting then to practice the cherished tradition of "food sharing" that holds deep significance in their cultural heritage. The event is also an occasion for them to exchange personal narratives—and embark on a collective journey of understanding and companionship.

Psychodrama workshop (provided by ISRC).

Fostering Connections through Shared Food, Stories, and Experiences

Ever since its establishment, the NTU Indigenous Students Resource Center has maintained a close partnership with NTU CIS and the Taiwan Indigenous Peoples Resource Center (TIPRC). Together, they have planned and held an array of events and activities to address the needs of indigenous students on campus. Last year,

the Center team welcomed its new Research Assistants Buhay Hayung and Kanme Mavaliw, who infuse fresh energy and thinking into Center operations while serving as beacons for fellow indigenous students. "Good Food, Good Things" has proved to be a vital occasion for indigenous students of different departments and ages to gather and support each other.

Such gatherings are also graced by indigenous alumni who return to the Center to share their personal journeys with the students over a meal. While the students may bear a diversity of anxieties and concerns, they remain united by a common thread—their indigenous heritage. This shared identity fosters an atmosphere of understanding and empathy in which attendees can forge meaningful connections. Kanme stressed, "These informal gatherings, with no specific agenda, encourage students to let their guard down and engage in honest conversations with their peers and mentors. Such interactions often lay the foundation for real friendships that extend beyond the event itself, creating a sense of belonging."

Building Cohesion and Expanding Horizons

Buhay's journey into indigenous affairs and student engagement was sparked by an invitation from a college friend who, like her, belonged to an indigenous community. Through this encounter, she was introduced to the diversity of Aboriginal groups on campus. Similarly, Kanme found a supportive community through Absoundtrack, a platform that connected her with a group of friends. Both Buhay and Kanme emphasized the profound significance of human connections in the indigenous way of life.

The indigenous students at NTU have a varied mix of backgrounds and experiences. Urban-dwelling students are disconnected from their native cultures, while students with tribal backgrounds suddenly face the stark contrast between life in the big city and their ancestral villages. To help them face such challenges and offer holistic support, ISRC is committed to nurturing connections among the indigenous students, empowering them to shed stigmas and reclaim their identities. Buhay and Kanme both stressed, "Our motivation stems from witnessing students embrace their self-recognition, empowerment, and cultural pride."

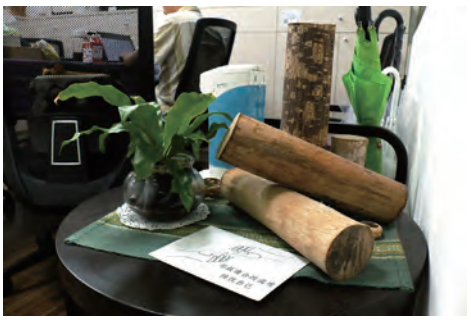
In recent years, ISRC has proactively ventured into innovative collaborations, as by co-hosting lectures with the Women's and Gender Research Program. These lectures delved into the intricate intersections between indigenous and gender identities. "By integrating the lens of gender, we draw a wider audience to explore the world of indigenous communities, simultaneously unveiling diverse facets and attributes of our students," noted Buham.

With the continuing efforts of Kanme and Buhay, ISRC envisions a future where NTU stands as a welcoming place of inclusivity and diversity. Their collective aspiration is for the campus to be a space where the indigenous spirit flourishes — where diversity is celebrated in all its vibrant forms.

The first-ever graduation ceremony for indigenous students, held in 2023 (provided by ISRC).

Discussing contemporary indigenous issues at "When men weave," co-hosted with the Women's and Gender Research Program (provided by ISRC).

The ISRC's highly-dedicated research assistants, Buhay (right) and Kanme (left); committed to organizing lectures, gatherings, and other activities, as well as providing encouragement and guidance to indigenous students.



The entrance of the ISRC. The arrangement conveys a message of warmth and friendliness.

Click or Scan the QR code to visit ISRC website and learn more about their contribution.