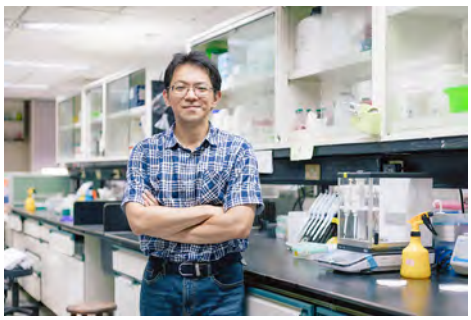
FEATURES

Unlocking the Past in Plant DNA

Prof. Cheng-Ruei Lee's Quest to Decode Domestication

Intro-video of Prof. Cheng-Ruei Lee.

Before most of the campus stirs to life, Prof. Cheng-Ruei Lee is already at work. It's not yet 7 a.m., and the young evolutionary geneticist is settled into his minimalist office at National Taiwan University's Institute of Ecology and Evolutionary Biology. A few cat figurines offer the only touch of whimsy. He moves quietly between his desk and the lab, occasionally whispering reminders to his students. This hushed, focused atmosphere is not just routine—it's a rhythm built on trust and mutual understanding between a mentor and his devoted team.



Prof. Cheng-Ruei Lee in his laboratory at the Institute of Ecology and Evolutionary Biology.

Lee leads a research group specializing in evolutionary genomics, particularly the genetic traces of how humans domesticated plants. Domestication, he explains, is the human-driven process of selecting desirable traits—like sweetness or softness—from wild species and cultivating them for use. Many wild plants bear bitter fruit as a natural deterrent to being eaten. Only through generations of human selection have they evolved into the sweet, juicy crops we know today.

But this refinement comes at a cost. “Domestication tends to narrow genetic diversity,” Lee notes. “That makes crops less resilient to climate extremes or emerging diseases.” His work, therefore, doesn’t stop at historical insight. By analyzing the genomes of wild relatives, Lee’s team seeks to rediscover genes that could bolster modern crops against environmental stressors—genes that may be critical as the planet faces intensifying climate change.

Rather than compete in saturated research areas, Lee embraces what he calls his personal “blue ocean strategy”—charting paths less taken. After earning his PhD abroad, he returned to Taiwan and focused on Asian crops, which were often overlooked in Western academic circles. His team has since revealed how climate variations across Asia have shaped the spread of mung beans and uncovered the genetic links between regional taste preferences and the many cultivated strains of bitter melon.

One of his most groundbreaking findings came through international collaboration. Working with Japanese researchers, Lee traced the domestication of wild adzuki beans in central Japan back 3,000 to 5,000 years. Published in Science, the study not only pinpoints the geographic origin of cultivated adzuki but also resolves a long-standing mystery in Japanese archaeology: it confirms that the Jōmon people—Japan’s ancient Indigenous population—possessed early agricultural knowledge.

“I never imagined we’d solve a question that big,” Lee says, eyes lighting up despite his naturally modest demeanor. Bridging plant science, anthropology, and history, it’s a discovery only such expansive interdisciplinary collaboration can achieve.

Lee’s own journey began at NTU, under the mentorship of Prof. Chao-Ti Ting of the Department of Life Science. Now, as a principal investigator, he’s adjusting to the responsibilities of leadership. “It’s a different role,” he admits. “But it’s rewarding when students from different backgrounds bring new perspectives. That exchange keeps the work exciting.” He encourages his students to follow their curiosity and cultivate the habits of independent inquiry.

This year, Lee received the Academia Sinica Award for Junior Research Investigators—an honor recognizing his early-career contributions to science in Taiwan. His next steps include expanding his studies to a broader array of species and investigating whether certain patterns of genetic mutation recur across different domesticated crops. Ultimately, he hopes to uncover genetic keys that can help crops adapt to our rapidly changing world.

“So… just keep doing the research, and keep contributing to NTU,” he says quietly, almost shyly, when asked about his long-term goals. It’s a typically humble response from a scholar who is quietly putting Asia’s native crops on the global scientific map.

Prof. Lee conducting research at his desk.

Prof. Lee holding a regular meeting with his research team.