

From Melbourne to Qingdao: Plant Scientist Finds His Second Home

Dialogue

By BI Weizi

Professor German Spangenberg, a fellow of the Australian Academy of Technology and Engineering and a Changjiang distinguished chair professor, has spent more than three decades working in South America, Europe, and Australia. Since early 2024, he has been based at Qingdao Agricultural University (QAU), where he directs research at the College of Grassland Science. In a recent interview with *Science and Technology Daily*, he candidly discussed why he chose Qingdao, his team's achievements, and how the city can attract more global talent.

A career decision rooted in friendship and vision

For Spangenberg, the decision to come to China was deeply personal. He had collaborated with Professor Zengyu Wang, dean of the College of Grassland Science, for over 30 years, dating back to their time together at ETH Zurich. "It has been the best career decision in my life," he said, describing Qingdao as a city that celebrates its roots while embracing modernity and looking to the future. "I fell in love with Qingdao from the moment I arrived. It is a beautiful coastal city with sea and mountains, wonderful scenery, and a combination of traditional Chinese architecture with some European touches."

He said what has impressed him most is the strong culture of teamwork and mutual support at QAU. He described the research environment as



German Spangenberg. (COURTESY/PHOTO)

"excellent and stimulating," with comprehensive facilities and access to state-of-the-art technology. He also praised the university's "exceptional and visionary leadership" and its inclusive decision-making style, summing up the ethos as "excellence with relevance."

His team's achievements are substantial. They have undertaken 16 provincial and national research projects, published more than 15 papers in top-tier journals indexed in the Science Citation Index, and filed 19 invention patents. Their work covers saline-alkali land plant germplasm, plant stress-resistance mechanisms, green biocontrol, and efficient grassland establishment. In talent development, two young researchers have received notable recognitions, and five experts from Australia, Uruguay, and Argentina have been recruited.

Building bridges between China and Latin America

International cooperation has been a defining feature of Spangenberg's time in Qingdao. He has facilitated exchanges between QAU and institutions in Uruguay, Argentina, Kenya, Colombia, and Australia. Notably, during Uruguayan President Yamandú Orsi's visit to China in February 2026, he witnessed the signing of cooperation documents between QAU and Uruguayan partners. The team also secured the hosting rights for the 2026 International Forage and Turf Breeding Conference, which will be held in Qingdao in October.

Spangenberg sees great potential for Qingdao as a global talent and innovation hub. He highlighted three strategic partnerships of global relevance: deepening Sino-Uruguayan collaborative research in grassland agriculture; fostering innova-

tion-driven partnerships in veterinary biologics and digital livestock technologies; and advancing research cooperation with Argentina on sustainable grassland systems. He argued that these partnerships would enhance Qingdao's economic and social development and open access to large Latin American markets.

"International cooperation is essential to developing science and technology for global food security," he said. "The power of international science and technology collaboration lies in enabling research and innovation that no single country can achieve alone."

Life in Qingdao and attracting global talent

Life in Qingdao has been rewarding. He praised the city's transportation system, saying it is better than Melbourne's despite their similar sizes. He also expressed admiration for mobile payments and digital platforms. "Without a doubt, WeChat is much better than WhatsApp," he remarked, adding that he now encourages his colleagues worldwide to use it. He also praised the warmth of the locals. "People in Qingdao are always so friendly, caring, and warm-hearted."

To attract more international talent, he offered a simple yet powerful suggestion: "The most effective way to attract more international talent is to build on the talent already attracted."

When asked if he would stay in Qingdao long-term and recommend it to others, he answered unequivocally: "Yes and yes." He had the highest praise for the Chinese, saying, "The 'Chinese miracle' is exclusively a credit to the Chinese people... The Chinese people have collectively achieved it with a very great sense of pride."

accuracy of the AI model," Zhao said. However, not all valuable mutations can be utilized. Once the mRNA enters the patient's body, it must trigger antigen presentation, and AI is needed to evaluate its capacity to facilitate intracellular antigen processing and transport pathways.

Guo said the model constructed by the research team comprised at least two components: one derived from vaccine development and patient clinical data, and another biophysical model covering 3D protein conformation, molecular interactions and affinity prediction. These complementary models enhance the accuracy of personalized target screening.

Currently, if an approved drug undergoes changes, such as a switch in raw material suppliers or process optimization, the drug must be reevaluated and validated. It may even require a new drug approval process. Under these existing rules, patient-specific mRNA vaccines face significant regulatory challenges. Developers, manufacturers and regulators must collaborate to establish regulatory frameworks for personalized medicines and achieve a win-win outcome: fostering innovation while ensuring safe and effective treatment.

Dynasty spread the huochong technology westward into Central and West Asia. After the Arabs adopted and mastered this technology, it spread further into Europe, driving innovation and development in European gun and cannon technology.

By the late Ming Dynasty, a pattern of two-way exchange in firearm technology had emerged, with Western artillery technology being introduced back into China. During this period, China continued to refine its indigenous huochong designs, resulting in an increased use of cast-iron versions. China also adopted advanced Western technologies, such as the Red Barbarian Cannon (Hongyi Dapao). These developments drove the evolution of traditional huochong technology into large-scale, standardized artillery pieces.

Tech+Culture

Technology Reveals Ancients' Survival Strategies

Edited by YAO Yan

Using flotation, a relic salvage technique, researchers have recovered microscopic plant remains from historical sites in China. Foxtail millet traces dating to around 8,600 years ago were unearthed at the Xinglong Site in Hebei and the Simagou Site in Inner Mongolia in north China; 7,700-year-old broomcorn and foxtail millet remains were found at Hebei's Sitai Site and Inner Mongolia's Yumin Site.

Stable carbon isotopes reveal prehistoric diets in north China shifted drastically. Around 9,000 years ago, residents of Bashang, a plateau region on the border of Hebei and Inner Mongolia, survived on hunting and foraging, relying mostly on C3 plants. By 7,500 BP, C4 millets became commonplace in meals, later evolving into staple crops.

Isotope signatures preserved in human and animal bones clearly record this foraging-to-farming transition. Ancient genome research suggests unbroken local genetic ancestry, indicating that millet farming in northwest Hebei likely arose through local domestication processes.

Cutting-edge scientific archaeology illuminates ancient ecological wisdom. Led by Liu Jianguo, a Chinese Academy of Social Sciences lab researcher, a team used satellite remote sensing, drone surveys and 3D site reconstruction to reconstruct prehistoric flood and irrigation control on the Jiangnan Plain in Hubei, showing early communities regulated water resources to adapt to climate shifts.

Another team led by Shang Xue, an associate professor at the University of Chinese Academy of Sciences, carried out

field experiments to reconstruct ancient millet farming practices on China's Loess Plateau. Ancient Chinese farmers distinguished soils by elevation, fertility and moisture, applying targeted fertilizers tailored to local land conditions. Shang's team used isotopic and botanical and soil microanalysis to confirm intentional fertilization on Yellow River farmlands starting in the mid-late Neolithic Age.

Agricultural domestication reshaped human civilization. While rice shaped global cultures, its origin story has long sparked academic debate, said Lü Houyuan from the Chinese Academy of Sciences. His team set a wild rice identification standard via phytolith scale patterns, paired with optical luminescence dating. Continuous 100,000-year rice phytolith records from the Shangshan Site in Zhejiang province in east China prove wild rice survived the Last Glacial Period along the Yangtze.

Humans gathered wild rice 24,000 years ago, began pre-domestication cultivation 13,000 years ago, and completed full rice domestication with settled farming by 11,000 BP after more than 3,000 years of evolution.

Lyu Peng, deputy director of the Institute of Archaeology at the Chinese Academy of Social Sciences, combined environmental, animal and plant data from three northern sites to analyze the Yumin Culture's ancient ecosystem and subsistence. Massive wild bison, horse and ass bones recovered at Yumin reveal plentiful wildlife eased the pressure to adopt full agriculture. The Yumin people thrived in the forest-steppe transition zone with mixed hunting, foraging and limited farming as a diversified survival strategy.

Is the Era of mRNA Vaccines Coming?

Science Outreach

By BI Weizi & ZHANG Jiaying

Recently, the results of a Phase III clinical trial of a personalized cancer vaccine have garnered widespread attention. The vaccine identifies "harmful mutations" through tumor genome sequencing and uses AI to design specific mRNA sequences. When used in combination with existing therapies, it significantly reduces the risk of recurrence and metastasis.

This is the first time an mRNA cancer vaccine has yielded positive results in a large-scale clinical trial. The deep integration of AI enables a "one-drug-per-patient" approach to cancer treatment.

Are mRNA cancer vaccines ushering in a new era of cancer therapy? *Science and Technology Daily* sought answers from experts.

Most people think of vaccines as

preventive shots to ward off disease. How can mRNA vaccines treat existing diseases?

"The immune system is the foundation upon which vaccines work. Once an mRNA enters a cell, it triggers the immune process of antigen presentation," explained Guo Jinjiang, head of Data Science at the Global Health Drug Discovery Institute based in Beijing. The antigen information carried by the mRNA is presented to T cells, a type of white blood cell that plays a central role in the immune system by destroying infected cells, enabling them to recognize and attack cancer cells with similar information.

"The most distinctive feature here is that the vaccine used for each individual is unique," Guo added. In the past, new drug development relied on finding the "greatest common denominator," whether for preventing infectious diseases or treating cancer.

For example, researchers would conduct genomic analyses on large patient cohorts to identify shared mutations, abnormal proteins or antigens

that could serve as common targets. However, because mutation profiles and immune characteristics vary greatly among patients, these shared targets often proved ineffective.

"Using digital models to analyze each patient's unique tumor-immune system characteristics and designing a targeted vaccine strategy based on this systemic understanding shift the trial-and-error phase into the digital realm," said Zhao Yu, a researcher at the Western Institute of Computing Technology in Chongqing. This represents the future of precision medicine. Recent clinical validation has made the practical implementation of this new model possible.

Developing a "patient-tailored" vaccine to target specific adverse mutations found in over 1,000 patients required comparing vast amounts of genomic and transcriptomic sequencing data, a process in which AI plays a pivotal role.

"The first step is to fish out the truly significant mutations from the background noise. The ability to distinguish these mutations tests the

Huochong: The World's Earliest Metal-barreled Firearm

Traditional Eastern Wisdom

By BI Weizi

The huochong is the world's earliest known metal-barreled firearm. It originated during the Yuan Dynasty, when the bamboo barrel of the Southern Song Dynasty's fire lance was replaced with metal barrels cast from copper and iron.

The huochong relied on gunpowder combustion to generate the high-pressure gas necessary to propel projectiles.

Its three fundamental structural components — the barrel, powder chamber, and breech — established the technical prototype for future firearms and artillery.

In ancient China, the huochong came in two varieties: handheld for individual soldiers and the mounted bowl-mouth for larger weapons.

The earliest extant huochong with a clear date of manufacture is a bronze bowl-mouth item dating back to 1298. It was discovered northeast of the Shangdu Ruins in today's Inner Mongolia autonomous region. Yuan Dynasty armies were equipped with both handheld and

bowl-mouth huochongs, utilizing them for sieges (both offensive and defensive) and field battles.

The development and use of the huochong reached its zenith during the Ming Dynasty. The weapon was either small, handheld models or large, artillery-style pieces, widely issued to the military for use in sieges, naval warfare and field battles. Capable of inflicting casualties and exerting a psychological deterrent, the huochong transformed combat patterns associated with traditional cold weapons.

The Mongols' westward campaigns and the resulting cultural exchange between the East and West during the Yuan



Chinese and foreign archaeology experts tour the China Archaeology Museum for research. (PHOTO: XINHUA)

π-HuB Project Enters Implementation Stage

From page 1

Han Jun, minister-counselor for education at the Chinese Embassy in Singapore, said big science projects such as the π -HuB project can mutually reinforce talent cultivation. He hoped the project would foster closer mechanisms for joint cultivation and academic exchange among universities and research institutes worldwide.

Uwe Völker, president of the Human Proteome Organization (HUPO), said the π -HuB project focuses on long-

term scientific goals and requires the joint participation of global scientific research community. HUPO stands ready to promote exchanges and cooperation in related fields.

The π -HuB project aims to map the human proteome, study its dynamic changes and underlying mechanisms, and explore the laws governing human development, aging, and the onset and progression of disease, thereby providing new scientific basis for disease prevention, diagnosis, and treatment.

2026 Nobel Prizes Honor Pioneering Scientific Achievements

From page 1

Chemistry: Henri B. Kagan, Kenso Soai

The Royal Swedish Academy of Sciences awarded the Nobel Prize in Chemistry 2026 to Henri B. Kagan and Kenso Soai "for the discovery of non-linear effects and autocatalysis in asymmetric organic synthesis."

Henri Kagan and Kenso Soai have provided a solution to a chemical mystery that is over a century old: how homochirality can emerge spontaneously.

The chemical reactions they have developed are spectacular," Heiner Linke, chair of the Nobel Committee for Chemistry, said.

Homo and chiral come from Greek words meaning "same" and "hand," respectively. Like hands, all amino acids exist as two mirrored variants, but living organisms contain only one of these mirror images.

The two laureates provided a solution to the puzzle of how such homochirality emerges.