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## Spring Festival Holiday Sees Consumer Market Boom

By LIN Yuchen

The Chinese New Year holiday saw a surge in consumer spending across various sectors, indicating a robust economic momentum. Being a prime time for family gatherings and celebrations, the festival is a significant window for observing consumer trends.

From domestic travel to outbound and inbound tourism, and traditional cultural activities such as visiting markets and attending performances, the festive season created a vibrant atmosphere of cultural consumption. The sheer scale of China's population, coupled with the heightened demand for goods and services during the holiday, fueled the economy's upward trajectory.

Data from various platforms corroborate the fervent consumer sentiment during the eight-day holiday. Overseas spending through online payment platforms like Alipay surged by 140 percent, with Southeast Asia experiencing a staggering 580 percent increase, driven by favorable visa policies.

Similarly, travel bookings, both domestic and international, witnessed substantial growth compared to the same period in 2019. Chinese tourists' footprints spanned across 100 countries, with bookings covering over 1,700 cities, reflecting the widespread appeal of travel during the holiday.

The buoyant consumer market during the Spring Festival underscores the resilience and vitality of the Chinese economy. With a focus on stimulating consumption and fostering new drivers of growth, China aims to harness the full potential of its vast domestic market, injecting renewed vigor for the economy's sustained recovery.

As the year of the Chinese Long or Dragon unfolds, the resounding success of Spring Festival consumption not only embodies the warmth of traditional celebrations but also the robustness and potential of the Chinese economy. Looking ahead, concerted efforts to nurture consumption, innovate consumer scenarios, and unleash consumption potential will propel China towards a path of high-quality development and prosperity.



A ceremony marking the launch of China's Qinling Station in Antarctica is held on February 7. The completion of the Qinling Station will provide a strong guarantee for scientists in China and around the world to continue to explore the mysteries of nature strengthen the global scientific community's common vision of sustainable development. (See related story on Page 4. PHOTO: VCG)

## Editor's Pick

## First Chinese Reference Genome Sequenced

By YU Haoyuan & CAO Xiuying

For the first time, a Chinese research team has successfully sequenced the entire Chinese genome from telomere to telomere (T2T), producing a high-quality, real human diploid. This includes the Y chromosome and a complete, gapless whole-genome reference sequence (44+XY).

The sample originated from the Locust Tree of Hongdong, Shanxi Province, near the ruins of the ancient Tang state established by Emperor Yao thousands of years ago. This led to the team calling the program Tang Yao, and the reference genome T2T-YAO.

### Specific Chinese genome required

The human reference genome, as

the standard genome for worldwide researchers, is biased and heavily underrepresents the Chinese population with its genetic diversity.

Research leader Gao Zhancheng found that a number of disease syndromes differed considerably in their clinical manifestations among different ethnic groups.

"To date, all sequencing diagnostic reports for tumors and genetic diseases rely on the U.S. reference genome GRCh37/38," said Gao. "The U.S.-based genome is derived from Africans and Europeans, is incomplete, and hardly representative of the Chinese and broader Asian populations."

"The prevailing opinion posits that the genetic variance between different

ethnic groups is only one in a thousand. However, from the clinical practice, the actual difference may be much larger than this figure," he said. "As a result, it is necessary for Chinese scientists to create a national reference genome."

Over the past three decades, scientists worldwide have been endeavoring to build a more complete and accurate reference genome in the biomedical research community. Two leading entities, Human Pangenome Reference Consortium (HPRC) and T2T Consortium have already researched Chinese inaugural human pangenome references. However, all participating scientists in both HPRC and T2T Consortium are from Europe and the U.S.

See page 3

## Text-to-Video Generator Sora a Mixed Blessing

By TANG Zhexiao

OpenAI, the creator of ChatGPT and image generator DALL-E, launched a new artificial intelligence (AI) tool that enables users to create short videos from text prompts on February 15.

Named "Sora," this AI-video tool can create videos of up to 60 seconds featuring highly detailed scenes, complex camera motion, and multiple characters with vibrant emotions, OpenAI said.

However, the San Francisco-based startup admitted that the new tool still has some limitations, such as possibly "mixing up left and right", according to Agence France-Presse (AFP).

The technology that supports Sora is an adaptation of DALL-E. It generates a video by starting off with noise and "gradually transforms it by removing the noise over many steps," the company explained. It recognizes objects and concepts listed

in the written prompt and pulls them out of the noise, so to speak, until a coherent series of video frames emerge.

The impact of Sora in shaping video generation and its implications for various industries has been seen through factors like enhanced text-to-video capabilities and exploration of novel applications.

According to AFP, the French video game giant Ubisoft hailed the tool as a "quantum leap forward" with the potential to let players and development teams express their imaginations.

"For professions like marketing or creative, multimodal models could be a game changer and could create significant cost savings for film and television makers, and may contribute to the proliferation of AI-generated content rather than using actors," Reece Hayden, senior analyst at a tech intelligence company ABI Research, told CBS MoneyWatch.

Besides the praise by some AI researchers, concerns about security were also raised.

"The video generation model is spurring excitement about advancing AI technology, along with growing concerns over how artificial deepfake videos worsen misinformation and disinformation during a pivotal election year worldwide," said *New Scientist*.

Hany Farid, professor at the University of California, Berkeley, specializing in image analysis and digital forensics, said "text-to-video will continue to rapidly improve — moving us closer and closer to a time when it will be difficult to distinguish the fake from the real."

The new video tool is not yet publicly available. OpenAI has restricted its use to "red teamers" and some visual artists, designers and filmmakers to test the product and deliver feedback before it is released more widely.

## International Cooperation

## Chinese Rice Tech Benefits Ivorian People

By WANG Xiaoxia

It's an early morning in the Guiguidou area of Divo city, southern Cote d'Ivoire, and a local farmer is skillfully driving a Chinese-made combine harvester through golden rice fields.

"In the past, our local rice variety could only produce about three tons per hectare. China's rice varieties and planting techniques have doubled the yield, and the rice is sweet and tasty. Everyone loves it," said a farmer named Benjamin.

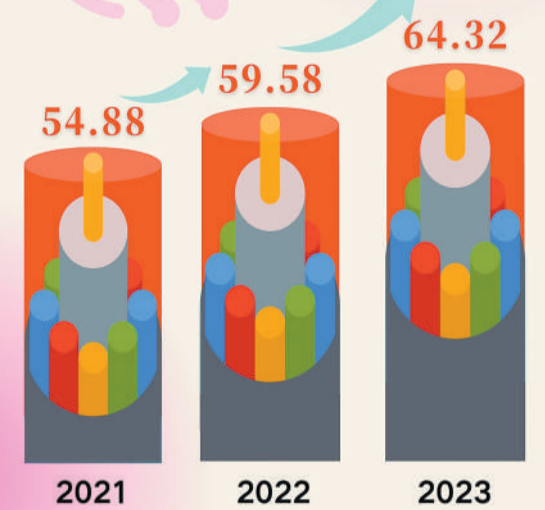
The Guiguidou area is a demonstration base for China-Cote d'Ivoire agricultural cooperation. In 1997, the area received the first group of Chinese experts. After the unremitting efforts of 11 groups of experts in nearly 30 years, the Guiguidou area has become a renowned paddy rice cultivation base in the country.

Benjamin, who grew up in the Guiguidou area, has been learning rice farming techniques from Chinese experts of the cooperation project, and seen the local development first hand over a 20 year period. Now, not only can he communicate with experts fluently in Chinese, but he has also become a technical instructor for local farmers, teaching them about rice transplanting, irrigation, fertilization and agricultural machinery.

At present, the cooperation project has certified four rice varieties in Cote d'Ivoire, which have greatly improved the yield, quality and taste of local traditional varieties. Among them, the variety C26 can yield about seven tons per hectare and has been widely promoted throughout the whole country, said Zhang Jing, an expert of the Chinese agricultural team to Cote d'Ivoire.

## New Graphic

### Progress in the Length of Optical Fiber Cable in China (million kilometers)



Source: China's Ministry of Industry and Information Technology  
Designed by YAO Yilu / Science and Technology Daily

WECHAT ACCOUNT



E-PAPER



# Better Understanding the Research Ecosystem



By Ronald Rousseau



Ronald Rousseau. (COURTESY PHOTO)

As the UNESCO states, science is mankind's greatest collective endeavor. The public, scientists and governments are all direct or indirect participants in the scientific enterprise. Their understanding and perception of science collectively influence whether science effectively responds to societal realities.

As a participant in the scientific endeavor, the *Journal of Data and Information Science (JDIS)* focuses on the science of science from a data and quantitative perspective, aiming to enhance stakeholders' understanding of interactions within the scientific community and the dynamics between science and society.

In recent years, sustained exposure to academic misconduct worldwide has damaged the public's trust in science and reduced the confidence of researchers. For the sake of better science, the *JDIS* has initiated a series of activities to respond to and reverse this situation.

**The evolution of research prestige**  
Historically, scientists and scientific institutions held prestige among peers and society. As scientific research evolved into a state-sponsored enterprise, the 19th-century efforts to measure scientific prestige, like Alphonse de Candolle's, who counted foreign members of scientific societies and academies, laid the groundwork.

In the 20th century, the advent of indicators such as the journal impact factor (which measures how frequently the average article in a journal has been cited in a particular year) became proxies for assessing prestige and quality. Despite early warnings against using such indicators for individual assessments, the "publish or perish" mentality took hold, impacting research topics, publication decisions and career advancement.

Although early bibliometricians such as Anthony van Raan (Leiden University, the Netherlands) warned not to use such indicators for the assessment of individuals, calling such a practice a mortal sin, past events led to the exact opposite. Recall Jorge E. Hirsch's h-index, which was introduced by Hirsch in 2005, and is calculated based on the number of papers a researcher has published and the number of times their papers have been cited. For example, if 107 of a scholar's 900 publications are cited more than 107 times, his h-index is 107.

The increased reliance on bibliometric indicators resulted in a culture of "playing the indicators," influencing scientists to prioritize quantity over quality. Research evaluations, often based solely on indicators, determined career trajectories.

**The dark side: fraud and paper mills**  
In this environment, fraudulent practices, including data and image fabrication, became no exceptions anymore. Unscrupulous companies, known as paper mills, emerged, offering ready-made publications for sale. Some successfully infiltrated prestigious journals, leading to retractions and damaged reputations.

Retractions, while essential for maintaining scholarly integrity, pose challenges for publishers. While acknowledging that mistakes can occur, retractions due to fraudulent behavior damage the reputation of authors, editors and publishers alike.

Fraudulent practices, including the use of paper mills, have posed a significant threat to the credibility of published research.

The *JDIS* aggregates and disseminates research that uses interdisciplinary approaches and large data sets to reveal the mechanisms underlying scientific research activities, thereby helping the public understand how science drives social progress, helping scientists improve their own work, helping governments develop more beneficial policies, and ultimately contributing to promoting better science.

### Combating scientific fraud and ensuring research integrity

In 2023, the *JDIS* issued a special call for papers on research integrity. The call aimed to encourage policymakers, scientometricians, publishers, institutions and researchers to delve into research strategies for countering academic misconduct.

The *JDIS's* commitment extends beyond publishing; it actively organizes symposia on crucial issues like research integrity, fostering engagement with the editorial board and the broader scientific community.

In conjunction with the publication of the Research Integrity special issue, the *JDIS*, in collaboration with Beijing Normal University at Zhuhai in

Guangdong province, south China, organized a symposium in Zhuhai in 2023 addressing "research integrity." The symposium attracted representatives from leading international publishers, including Wiley, Taylor & Francis, Springer Nature, Sage Publications, Elsevier, Frontiers, IOP Publishing, PLoS, IMR Press, and other organizations such as COPE, Crossref, China Educational Publications Import & Export Corporation, the China Hospital Research Integrity Alliance, and the Charlesworth Group.

During the event, a memorandum of understanding was signed, signaling the collaborative effort required to safeguard the integrity of scientific research.

Going forward, the *JDIS* will continue supporting policymakers and the public in understanding evolving patterns in scientific development and scientific growth. This includes promoting the prudent use of scientific evaluation tools and collaboratively creating a supportive environment for research and innovation. All of these initiatives serve our ultimate goal, that is, enabling researchers to publish the best possible scientific research to create a better life.

The author is the Co-Editor-in-Chief of the *JDIS*.

*I see the JDIS as boosting the transition of China from playing a minor role in the information science field 20 years ago to being a major contributor today.*

*Twenty years ago, in Western information science journals there seemed to be few articles written by Chinese scholars based in China. After this, there was an increase in submissions to Western journals from China-based scholars but these tended to be very quantitative-focused and methods-focused with a lack of theory, so the findings were not very useful or impactful.*

*Today, there are many important research groups and scholars in China in the field of information science that are looked up to in the West. I think this has oc-*

*curred due to efforts like the JDIS, which has bridged and facilitated academic dialogue between China and the world. It has also served as a flagship to promote the idea of disseminating Chinese scholarships outside of China.*

*I am hoping that the future will see China introduce new approaches and topics in the field of information science, leading the world in what is researched and how it is researched in the field. This is perhaps the next stage and the JDIS would be the perfect venue to host this transformation.*

— Mike Thelwall

Professor at the Information School, University of Sheffield, the UK.

## Policy

# Ethical Guideline for Brain-Computer Interface Released

By ZHONG Jianli

China's Ministry of Science and Technology has recently released a document to guide the development of brain-computer interface (BCI) technology and prevent ethical risks in the process of BCI research and application.

The BCI creates information channels between the brain and external devices, allowing for direct information interaction. Its application mainly includes medical health, communication and entertainment, particularly in improving motor, communication and perceptual functions for patients with neurological disabilities.

The guideline emphasizes the need to ensure that BCI research should primarily focus on restorative BCI technology, and serve to meet the public's health needs. For non-medical purposes such as attention, sleep or memory regulation and other augmentative BCI, exploration and development are encouraged to a certain extent under strict standards and clear benefits.

The guideline also outlines general requirements for BCI research, including compliance with relevant laws and regulations in China, and internationally recognized ethical guidelines, profes-

sional consensus and technical standards. It prohibits dissemination of false advertising information on the effects of BCI.

Regarding clinical trials of innovative BCI products for rare diseases with no other effective treatment methods, the guideline says the trials can be conducted under strict compliance with relevant national regulations on medical devices and clinical research, with full informed consent.

Safety risk prevention and control mechanisms, including strict operational procedures, correction mechanisms, emergency plans and suspension procedures, are required to ensure the safety of trial subjects.

In particular, the document proposes the ethical considerations for augmentative BCI, emphasizing the need for a thorough assessment of risks and benefits, and minimization of negative impacts on individuals. It also warns against the potential for addiction and interference with normal human thinking and behavior.

It is recommended to avoid BCIs that replace or weaken human judgment and decision-making abilities until they are proven to be superior to human levels and are widely recognized.



A visitor experiences the brain-computer interface during the China International Technology Fair in Shanghai in June 2023. (PHOTO: VCG)

# STB Model Boosts Agricultural Modernization

By CHEN Chunyou & MA Aiping

"Whenever I look back on the work and life at the science and technology backyard (STB), the memory of operating on the farmland is fresh in my mind. The STB is a vivid example of making research out of practice and putting research results into practice again," Han Saizheng, a postgraduate student at Northwest A&F University's Ningxia Tanyang STB, told *Science and Technology Daily*.

For the first time, the STB has been written into the No. 1 Central Document. The 2024 version, released in early February, stresses promoting the STB model and encouraging experts from research institutes and universities to serve agriculture and rural areas.

The basic configuration of an STB is a backyard with a few cottages where students work and then do research. The China Agricultural University (CAU) established the first STB, the Baizhai STB in Quzhou county, Hebei province, in 2009.

In 2022, the Ministry of Education, the Ministry of Agriculture and Rural Affairs, and the China Association for Science and Technology jointly issued a notice on popularizing the STB talent cultivation model among postgraduate students in rural areas, and a second one on supporting the construction of a batch of STB. These two documents reinforced support for STBs and provided targeted services for agriculture and rural areas by expanding the scale of talent cultivation and strengthening standardized management.

Zhang Fusuo, founder of the STB model and a professor at CAU, told *Science and Technology Daily* that the original intention of establishing the STBs was to send agricultural postgraduate students to the frontline of agricultural

production. These students are expected to provide farmers with technological training and services, and help solve practical problems in agriculture and rural affairs.

Although the STBs are small in scale, they play a huge role in serving agriculture and revitalizing rural areas. "The model moves research from laboratories to farmers' fields, forming a pattern of collaborative innovation with universities and research institutes," said Lin Wanlong, vice president of CAU.

To date, more than 30 agricultural universities have established about 300 STBs, covering nearly 20 provinces and provincial-level regions.

The STBs have become an engine for the modernization of agriculture and rural areas. "In the future, this model should not only target small-scale farmers and the upgrading of traditional production technologies, but should also connect with modern industries and enterprises," Lin said.

The STB model has also been promoted in Laos and eight African countries. "It has evolved from the initial stage 1.0 to the current stage 3.0," Zhang said. "In the 1.0 stage, the main focus was to assist small-scale farmers, providing them with technical services, and motivating more small-scale farmers to engage in this model through technological demonstrations in households and large farms. In the 2.0 stage, it aimed to promote the upgrading of rural industries, increase farmers' income and rid them of poverty. The 3.0 stage is to empower rural revitalization with strong technology and talent support."

"Seeing that the STB has entered a new stage, we hope to bring more changes to the countryside with the joint efforts of the STB faculty and students nationwide," Zhang said.

## Case Study

# LED 'Little Giant' Assists Rural Revitalization

By Yu Haoyuan

Starting and succeeding in business is not easy and requires unwavering faith and dogged determination, says Ge Ailin, CEO of Jiangsu Zhaolv Metal Products Co., Ltd (Zhaolv).

It is because of this that the industrious entrepreneur is always cognizant of never forgetting the place where he was raised. "Assisting with rural revitalization is one of the best ways to give back to society," he says.



At the beginning of 2024, Zhaolv implemented a fully automated H-type automobile headlamp heat sink production line. (COURTESY PHOTO)

Fifteen years ago, Ge took a big gamble on developing the LED industry. He gave up his regular job and set up Zhaolv, which specializes in producing heat sinks for LED lighting fixtures in his hometown of Jilin village, Taizhou. The company was initially started with 15 people in a 600 m<sup>2</sup> workshop.

For most rural startups, limited technological prowess and a shortage of skilled workers restrict their growth, Zhaolv was no exception.

In response to these challenges, a

strategic emphasis has been placed on technological innovation. The company began to ramp up its investment, continually purchase state-of-the-art production equipment and assemble a highly skilled R&D team to bolster its competitive edge in the market.

With a commitment exceeding 60 million RMB towards technological advancements, Zhaolv has been successfully recognized as a "Little Giant" firm by the Chinese government. The name refers to those innovation-driven small- and medium-sized enterprises, which own core technologies in a niche market and show admirable growth potential.

Zhaolv has thrived in the entrepreneurial landscape for over a decade, boasting an impressive portfolio of 48 utility patents. This year, it has further strengthened its intellectual property arsenal by applying for three new invention patents, focusing on those with elevated technological sophistication.

It is therefore no surprise that the company holds a prominent position in the industry, with a share of 20 percent in China's LED lighting aluminum market.

Zhaolv has experienced substantial growth over the years. Currently, it has 130 employees with a 2000 m<sup>2</sup> factory. It has not only participated in key municipal projects, but also developed partnerships

with international brands such as BMW, Mercedes, Honda, Toyota and Volkswagen.

Ge attributes company success to its innovation strategy.

"Through continuous technical innovation investment and material formula improvement, Zhaolv has improved its machining and cutting performance," said Ge, adding, "We customized machinery and shortened three processing operations to one, greatly saving the processing cost."

As for the future, Zhaolv will invest more in further developing technologies and bringing equipment up to date. At the beginning of this year, the company had already implemented a fully automated H-type automobile headlamp heat sink production line.

Success hasn't made Ge forget his roots. Over the past 15 years, the company has taken part in rural revitalization. It has upgraded the idle assets of the village, optimized the local young technical talent pool and increased their employment. The company also focuses on anti-poverty initiatives, and has subsidized 10 local poor students and families.

"Choosing my hometown to start a business was an instinctive reaction. As a local enterprise, it is my duty to serve the people and relieve the villagers of their worries," said Ge.

## INSIGHTS

## China Forges Ahead in Space

## Voice of the World

Edited by GONG Qian

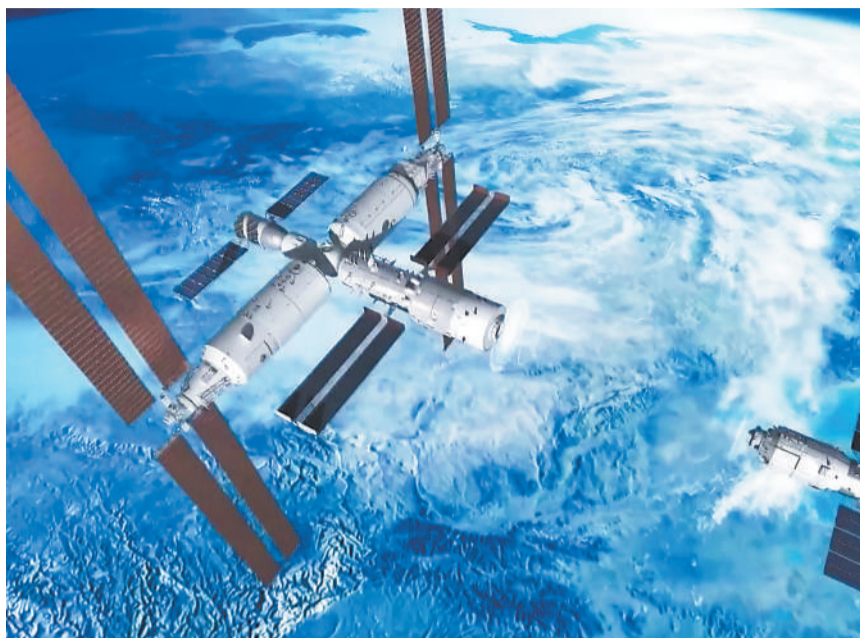
Looking back to the past decades, China has ramped up its solar system and space science exploration to become a powerful player in the field with many major feats. They include the Chang'e 5 mission, China's fifth lunar exploration that brought back lunar samples in 2020; the Zhurong rover landing on Mars in 2021; and the crews of Shenzhou-15 and Shenzhou-16, China's manned aircraft, meeting in space in 2023. These and other impressive achievements have given a huge boost to space science and the science community.

China is now building on these accomplishments with a series of major missions across the next decade, *Astronomy Magazine* reported.

Its space exploration programs in 2024 and near future include Chang'e-6 missions to collect more lunar samples and four more spacecraft missions.

## Eye-catching missions in 2024

In January, the Tianzhou-7 cargo craft was sent to Tiangong, China's space station. The three-hour docking was "fuel and technology intensive", said *SpaceNews*. The Tianzhou spacecraft has recently been upgraded and can carry around 7,400 kg of cargo to Tiangong. This improvement means now China needs to launch a resupply mission once every eight months in-



The simulated image shows China's cargo spacecraft Tianzhou-7 docking with the Tiangong space station. (PHOTO: CHINA MANNED SPACE)

stead of once every six months, according to *Space.com*.

Additionally, China plans to launch three further missions to Tiangong this year — the Shenzhou-18 and 19 crewed missions and the Tianzhou-8 mission.

The world is awaiting another big move in lunar exploration. The Chang'e-6 mission, scheduled to take place later this year, is tasked with bringing back samples from the far side of the moon, a never-before accomplished feat, *Universe Today* reported on its website.

China's consistent investment in and dedication to space discovery are evidenced by this newest endeavor, another

significant stride that propagates not just national but international astrophysical knowledge, said *ISP Today*.

"With the future Chang'e 6 mission, the limits of human exploration will be pushed even farther, as we seek to unveil the mysteries that lie in the shadowed craters and rugged terrain of our Moon's silent sentinel," *ISP Today* noted.

## Forging international collaborations

Already one of the world's top space powers, China is increasingly looking to forge international collaborations.

The Chang'e-6 is expected to carry

equipment from France, Italy, the EU and Pakistan on the mission's lander and orbiter. This level of international participation highlights the global interest in lunar exploration and the growing recognition of China's capabilities in space missions, said *Space Daily*.

The China National Space Administration (CNSA) has announced opportunities to join both the Chang'e-7 and Chang'e-8 missions, which are expected to be launched in 2026 and 2028, respectively.

According to *BNN Breaking*, the Chang'e-8 mission shows the power of collaboration and innovation in space exploration. By inviting developers from around the world to contribute to the mission, the CNSA is fostering a global community of space enthusiasts and experts working towards a common goal. This is necessary to push the limits of what's possible in space exploration and unlock the secrets of the universe.

With future missions in the pipeline, China is paving the way for the construction of an International Lunar Research Station. As one of the initiators of the program, China is inviting more global partners to participate in it.

It is clear that China continues to advance its capabilities and has set out a roadmap to comprehensively explore the solar system via lunar, planetary and deep-space missions. These in turn are strengthening and inspiring China's scientific community, and will bring new value, science and impetus to astronomy and space exploration, *Astronomy Magazine* added.

## Comment

## Geopolitics Must Not Block Sci-tech Cooperation

Edited by QI Liming

A short-term extension of the U.S.-China *Science and Technology Agreement (STA)* expires this February, and Denis Simon, affiliated with the Institute for China-America Studies, told *South China Morning Post* on February 2 that as a consequence, the U.S. was "very concerned" about American scientific personnel being detained or not being able to return home from China. Although this statement seemed to signal the legitimate concerns arising from the lack of renewal of the agreement, in reality, it cannot stand up to scrutiny and is groundless.

China has long welcomed communication and exchanges with the U.S., but the U.S. has long maintained a hegemonic mindset in its dealings with China. In Washington, being "anti-China" seems to have become a form of political correctness, and sci-tech cooperation has not been immune to manipulation by U.S. politicians.

Actually, sci-tech cooperation between China and the U.S. should be a positive move for the two major economies to benefit the future of humankind. In this regard, for more than 40 years, the STA has been the largest cooperation mechanism between the two countries in the field of science and technology. Naturally, this mechanism is not only beneficial to China, but a mutually beneficial framework between the two sides.

As for the renewing of the STA, Nicholas B. Dirks, president and CEO of The New York Academy of Sciences, said that geopolitics should not get in the way of scientific cooperation with China. "From my perch as president and CEO of The New York Academy of Sciences, I strongly believe that it is in the interest of global science to advocate for the agreement's full renewal," he said.

Renewing the agreement is not just a nod to the past decades of fruitful collaboration, but also a commitment to a future where science, innovation and progress continue to thrive. It's a declaration that even in times of discord, the pursuit of knowledge and understanding remains a firm bridge between nations, said Dirks.

Meanwhile, Simon said the fact that the U.S. is now "Talking about de-

linking from China, or de-risking, a popular word right now, when China has something meaningful to offer us, is ironic." A new version of the STA, in which there was a shared vision, could yield a one plus one equals three outcome; a synergy in which both countries could benefit, said Simon.

"I do not know of any global challenge problem, including climate change, global pandemics, etc., that can be solved in any kind of meaningful way without the direct cooperation and collaboration between the U.S. and China," he added.

Since its inception in 1979, the STA has laid the groundwork for an unparalleled exchange of knowledge, talent and resources between two countries that are scientific powerhouses. Collaboration enables scientists from different nations to pool their expertise and resources, thereby accelerating the pace of discovery. This benefits all of humanity and should be at the heart of any decision on renewing the STA.

Science and technology have always thrived on the exchange of ideas, cross-border collaboration and the free flow of information. Attempting to isolate nations from one another's scientific pursuits will stifle progress, hinder innovation and hamper our collective ability to tackle global challenges, said Dirks.

Incomprehensibly, Chinese students arriving in the U.S. were denied entry without probable cause every month for the past few months. On January 28, the Chinese Embassy in the United States celebrated the 45th anniversary of China-U.S. student exchanges and the 2024 Spring Festival Gala for Chinese and American youth. Speaking at the event, the Chinese Ambassador Xie Feng to the U.S. said that scientific progress can only be achieved when the brightest minds are brought together. "The dynamism of thought springs from mutual learning, and scientific progress would be impossible without exchanges," said Xie.

All in all, hegemonism and geopolitics should not become the roadblock to sound sci-tech relations. Despite differences in ideology and political systems, the pursuit of scientific knowledge, understanding and solutions transcends borders and obstacles. This is the call from scholars and scientists around the world.



Chinese Embassy in the United States holds a gala to celebrate the 45th anniversary of China-U.S. student exchanges and the Spring Festival for Chinese and American youths. (PHOTO: XINHUA)

## Opinion

## 'Visa-free Era' Shows China Opening up More

By TANG Zhexiao

With the 30-day mutual visa exemption between China and Singapore taking effect for ordinary passport holders on Chinese Lunar New Year's Eve, China is implementing unilateral and mutual visa-free policies for a larger circle of friends, ushering in a "visa-free era" that includes more and more countries.

According to the National Immigration Administration's estimation, the Chinese mainland has seen a daily average of 1.8 million inbound and outbound passenger trips during the

Spring Festival holiday this year, nearly 3.3 times larger than last year's figure.

Data from Fliggy, China's leading online travel platform, showed that outbound travel bookings during the 2024 Spring Festival holiday hit a four-year high, surging almost 10 times year-on-year.

From December 2023, citizens of France, Germany, Italy, the Netherlands, Spain and Malaysia were allowed visa-free entry to China for up to 15 days.

In January 2024, along with the five European countries, Irish and Swiss nationals will now be allowed to enter China without a visa.

The trial program will be effective for one year, with the aim of "encouraging more people to visit for business and tourism," the Associated Press reported.

According to the data from China's Ministry of Foreign Affairs, China has signed mutual visa exemption agreements with 157

countries to date, covering different types of passports, reached agreements or arrangements to simplify visa procedures with 44 countries, and enjoys comprehensive mutual visa exemption with 23 countries, including Thailand, Singapore, the Maldives and the UAE. In addition, over 60 countries and regions offer visa-free or visa-on-arrival policies to Chinese citizens.

All these measures increasingly make Chinese citizens' outbound trips easier, and help foreigners travel, work, study and live in China more conveniently, and are being well received by the international community.

According to Euronews, last year saw a surge in interest in China as a tourist destination among Europeans. Data from Chinese online travel agency Trip.com showed a 663 percent increase in overall bookings from Europe to China compared to 2022.

The visa-free era is also generating positive effects. "Greater opening-up measures would shore up confidence and encourage investment in the country at a time when both are highly sought after," said the *South China Morning Post*.

In a statement, the EU Chamber of Commerce in China called the move a

"tangible and practical improvement which will also increase business confidence," with the hope that more European nations would be given visa-free access soon.

Josep Maria Gomes, an international business developer with the Barcelona Chamber of Commerce in Spain, said that China has always been a focus, "That's always in our internationalization plans. It's not only a country with great potential, [being ahead of us] in some technologies, but a country where our companies must seek [a] presence," he said.

Meanwhile, the executive director of the UN World Tourism Organization said that China's visa-free policies will help the global tourism industry recover and China's booming tourism industry will lead neighboring countries to prosper together.

Improving visa policies and facilitating cross-border travel is an important measure, through which the diplomatic service contributes to China's high-quality development and high-level opening-up. This brings more opportunities for deepening friendly exchanges and mutually beneficial cooperation between China and other countries, said China's Ministry of Foreign Affairs.



Chinese tourists from Shanghai arrive at South Korea's Jeju International Airport during the Spring Festival holiday on February 8. (PHOTO: VCG)

## First Chinese Reference Genome Sequenced

From page 1

## Choosing appropriate sample

In 2020, Gao assembled a team in Shanxi to develop a Chinese genome reference.

Selecting the appropriate samples marked the initial and crucial phase for the research team. The aim of crafting a Chinese-specific genome is to better serve contemporary medical practices, so the samples need to better represent the genomic characteristics of modern Chinese. As a result, the team picked a healthy male Han Chinese as

a sample.

Kang Yu, a member of the research team, emphasized the importance of the sample, saying, "It would better represent the modern Chinese genetic traits." T2T-YAO was designated as the project's primary focus, so the team decided to start with the Han Chinese, the largest ethnic group in the nation.

The team's choice was influenced by a historical belief held by many Chinese, both domestically and abroad, concerning their ancestral migration

600 years ago. The majority of the T2T-YAO is characterized by East Asian populations according to ancestry analysis. "We are confident that the genome will serve as an accurate representation of the contemporary Han Chinese population," said Gao.

T2T-YAO showed significant differences between the Chinese and European genomes. When compared with the newly released human reference genome T2T-CHM13 by the T2T Consortium in 2022, the comparison disclosed variances in 11 percent of

the sequences and 5 percent of the genes.

Chen Runsheng, an academician at the Chinese Academy of Sciences (CAS), highlighted that the unveiling of the complete Chinese genome sequence will change the previous perception that genetic variances among various human populations only differ by one-thousandth of a percent.

## T2T-YAO release within just two years

The Human Genome Project (HGP) took three decades of work to obtain

the complete haploid human genome sequence, including the Y chromosome, but T2T-YAO was completed within just two years.

Assessed by Merqury, the number shows that the quality value of T2T-YAO is better than T2T-CHM13. Moreover, T2T-YAO is the inaugural diploid genome, containing both sets of chromosomes, inclusive of the Y chromosome.

"The reason we could assemble T2T-YAO so fast is thanks to rapid advances in DNA sequencing and splic-

ing technology, as well as the accumulation of a great deal of technological advancement and theoretical knowledge, including HGP," said Kang.

"Moving forward, we will conduct further parsing and annotation of T2T-YAO, so that it can be better used in clinical settings," said Kang. He hopes to pioneer sequencing techniques, genomic analyses and diagnostic tools based on an indigenous reference genome to better serve Chinese people, and to promote the development of new drugs in the future.

# Soybean Expert Hails Sino-Russian Teamwork

## Dialogue

By LONG Yun, BI Weizi & LI Liyun

On February 4, Russian expert Valentina Sinegovskaia was honored with the Chinese Government Friendship Award in recognition of her significant contribution to advancing Sino-Russian sci-tech cooperation in the field of soybean.

"This award is not only a personal honor but a tribute to the collective effort of my team and colleagues from China," Sinegovskaia said in a recent interview with *Science and Technology Daily*.

### A 'towering tree'

Currently, Sinegovskaia is the leading researcher at the plant physiology laboratory of the All-Russia Scientific Research Institute of Soybeans (ARSRIS). Her research mainly focuses on photosynthesis physiology.

Sinegovskaia's research and teaching career spans more than four decades without ever slowing down. Influenced by her mentor, she said she finds great joy in teaching, students, saying, "When I see how satisfied the students are when they learn something new, I feel all my hard work is worth it."

Her research enthusiasm was infectious as she talked about the untapped potential within photosynthesis physiology. Moreover, her work has taken this interest to a new level, especially regarding its impact on soybean yield.

Photosynthesis, the process by which a plant absorbs light energy and synthesizes carbon dioxide and water into organic compounds, has long been a subject of study. According to Sinegovskaia, photosynthesis physiology not only contributes to agricultural development but also propels other scientific disciplines forward.



Professor Valentina Sinegovskaia. (PHOTO: S&T DAILY)

"We have not fully unraveled the mysteries of photosynthesis. There is more to explore, more to understand. By doing so, we can drive agricultural development and even promote food security," she said.

In her perspective, all scientific endeavors are a process of self-improvement and discovery. The Russian scientist likens herself to a towering tree. "Over time, I've grown, and provided shelter and support to more students and team members, also contributing to my country's progress. I believe that every bit of effort I make is meaningful," she said.

Her message is clear: in the interconnected world of scientific research, collaboration between teacher and student, different disciplines and countries is not just beneficial but essential.

**Sino-Russian cooperation**  
Since 1989, Sinegovskaia has been promoting sci-tech cooperation between China and Russia.

She has played a pivotal role in establishing and nurturing a partnership between the ARSRIS and the branch of the Heilongjiang Academy of Agricultural Sciences in Haihe, a city in Heilongjiang. Their collaboration has led to the joint development of several soybean varieties, showcasing the power of international teamwork in advancing agricultural practices and outcomes.

In 2018, on behalf of ARSRIS, she signed a memorandum of understanding with the Institute of Crop Sciences at the Chinese Academy of Agricultural Sciences (ICS-CAAS), laying the groundwork for further cooperation in areas

such as breeding early-maturing soybean varieties, identifying the growth periods of Russian soybean varieties, and exchanging molecular breeding techniques.

**The way ahead**  
Her insight on China is constantly evolving 35 years on. Based on her firsthand observations, She has seen firsthand China's progress in various spheres, particularly in science and technology. In her perspective, China's endogenous strength has not only driven its dynamic advancement but also reshaped how the world views and engages with it.

Currently, Sinegovskaia is recruited as an academic advisor at the Heihe Soybean Research Center of CAAS. She says According to Sinegovskaia, both sides could join hands to combine the study of photosynthesis with other disciplines, which may lead to new varieties and methods to grow soybeans and enhance production.

Her recent insights into China's genetic research on soybeans have been particularly enlightening. "Our comparative studies of soybean seeds from China, the U.S. and Canada have consistently shown that Chinese varieties produce the highest yield," she said.

Sinegovskaia sees a bright future for Sino-Russian cooperation and hopes for scientific breakthroughs based on fundamental research. Professor Han Tianfu from ICS-CAAS added that Sino-Russian future cooperation has immense potential. Sharing knowledge and information across borders exemplifies the thinking that science knows no boundaries, she added.

YUAN Shan from ICS-CAAS also contributed to this article.

## My China Story

# An Ethiopian Scholar Immerses in Green Development

By ZONG Shihan

"I would love to stay in China because China has been a global leader in scientific research and innovation," Dr. Busha Assaba Fayisa, an Ethiopian postdoctoral fellow at the School of Chemical Engineering and Technology, Tianjin University (TJU), told *Science and Technology Daily* recently.

Fayisa came to China to pursue a doctoral degree eight years ago. Now, he is committed to innovative research on the catalytic utilization of CO<sub>2</sub> via its derivatives. During his stay, he has witnessed progress in China's green development and is keen to promote cooperation between China and Ethiopia with his knowledge.

### Fortunate to study in China

"China's relationship with Ethiopia has been strong for over 50 years, and it has been further strengthened by the Belt and Road Initiative, which has led to increased collaboration in various sectors, including infrastructure, economy, and cultural and social development. I also benefit greatly from the close bilateral relations," said Fayisa.

With a five-year chemistry study background and four years of teaching experience in Ethiopia's university, Fayisa joined the C1 Chemistry and Technology Group at China's Tianjin University to pursue his doctoral degree.

"I was fortunate enough to come to China to pursue my Ph.D. in green chemistry," he said, adding that "I have been working on the design and development of copper-based catalysts for the synthesis of methanol and ethylene glycol from the hydrogenation of CO<sub>2</sub>-derived ethylene carbonate." Joining the C1 chemistry and technology group, under supervision of Prof. Ma Xinbin and Wang Yue, allowed Fayisa to collaborate with a renowned and hard-working team that has shown excellent progress in the field and gain valuable insights into global research trends and practices.

The Chinese government's policy of supporting international students has provided Fayisa with valuable academic opportunities. Under the MOFCOM Scholarship, set up by China's Ministry of Commerce, he has successfully completed his PhD research and can focus more on green chemistry research.

### Impressive Green development

China has been investing in various green technologies and initiatives to reduce CO<sub>2</sub> emissions and promote sustainable development. Since his arrival in China, Fayisa has seen great progress in green development.

The first is that national policy



Dr. Busha Assaba Fayisa. (COURTESY PHOTO)

plays a huge role in driving changes. "China has proposed to achieve its 'dual carbon' goal of peaking CO<sub>2</sub> emissions by 2030 and achieving carbon neutrality by 2060 through technology," said Fayisa, adding that remarkable progress has been achieved in research and development and industrialization in the past several years.

In recent years, large-scale industrial projects have been implemented in China to demonstrate the potential of CO<sub>2</sub> utilization. As an example, Fayisa mentioned his research group's remarkable achievements in research and industrial application on CO<sub>2</sub> utilization. China has made progress in CCUS technology, which is a process of capturing CO<sub>2</sub> discharged from fossil power generation and industrial processes for underground storage or reuse. Busha mentioned the Qilu-Shengli Oilfield CCUS project, China's first megaton-scale carbon capture, utilization and storage project, which is expected to reduce CO<sub>2</sub> emissions by one million tons per year, equivalent to planting nearly nine million trees.

"Chinese researchers are very active in CO<sub>2</sub> utilization areas," he said, adding that methanol converted from CO<sub>2</sub> can be used as a fuel or as a raw material for the chemical industry, helping to solve the problem of global warming.

"I will stay in China while contributing more to green development in the future. I would also like to seek more forms of collaboration between institutions or universities of China and Ethiopia," said Fayisa.

This article was contributed by TJU.

## Traditional Eastern Wisdom

# An Auspicious Treasure: Underglaze Red Porcelain

By YAO Yilu

Underglaze red porcelain stands as a revered artistic treasure within the realm of traditional ceramics, representing a significant innovation attributed to the skilled artisans of Jingdezhen during the mid-Yuan Dynasty. This technique reached its pinnacle during the Ming Dynasty and further evolved throughout the Qing Dynasty.

The manufacturing process of underglaze red porcelain closely mirrors that of contemporary blue and white porcelain. It involves the use of copper oxide as a colorant, meticulously applied onto the pottery pattern, subsequently coated with a transparent glaze, and fired within a high-temperature reduction flame atmosphere. Given that the red pattern resides beneath the glaze, it is aptly termed underglaze red porcelain.

Authentic coloration is exceedingly rare. The standard color development is intricately linked to the copper content within the coloring material, the composition of the base glaze, and the exacting demands of the firing atmosphere and kiln temperature. Even the slightest alteration in the formulation and firing conditions can result in incorrect coloration, hence genuine pure underglaze red porcelain from the Yuan Dynasty is a rarity, often manifesting as a subdued grayish red.

The significance and excellence of underglaze red porcelain extend beyond the technical value. These works of art serve as vessels of cultural heritage, encapsulating the nation's history, cultural significance, and aesthetic sensibilities.

In Chinese symbolism, red embodies solemnity and nobility, on behalf of happiness and good fortune. It also conveys a positive and enterprising spirit, representing people's infinite yearning for a better life and a prosperous society.

# Qinling, China's 5th Antarctic Station Begins Crucial Research

## Science Outreach

By WU Qiong & LONG Yun

The Qinling Station, China's fifth research station in Antarctica, became operational on February 7, marking a milestone in polar exploration.

The Chinese Foreign Ministry said the research facility is intended to help enhance scientific understanding of Antarctica, provide a platform for China to cooperate with other countries in scientific expeditions, and promote peace and sustainable development in the region.

### What Qinling represents

The Qinling Station is located along the coast of the Ross Sea, a region known for its sensitivity to global climate changes and an ideal spot for polar scientific exploration. It will not only fill a gap in Antarctic research

coverage but also provide vital support for international studies on energy and material exchanges in the fields of the earth system, marine biology ecology and global climate changes. Establishing the station underscores China's commitment to understanding, protecting and utilizing Antarctica.

### Why the name Qinling

There are two reasons for choosing the name Qinling. The Qinling Mountains, a major mountain range in China, act as a natural east-west divider and represent a rich diversity of geography, history and culture. The Qinling Station too is located near a transverse mountain range that geographically divides Antarctica.

Besides, the Qinling region is known for its rich biodiversity and medicinal plants and is the sole nesting ground of the crested ibis, a bird once on the brink of extinction. The name therefore is meant to convey the station's green, eco-friendly and energy-efficient design philosophy. This aligns with China's emphasis on protecting the Antarctic environment and its advocacy of "green exploration."

**How Qinling was constructed**  
Building infrastructure in Antarctica, dubbed the "white desert" because of its vast ice-covered landscape, poses significant challenges due to the extreme cold and high winds. It took over a decade for the Qinling Station to take shape from the site survey to the completion of its main structure.

Wang Zhechao, the inaugural station chief, described the three-phase construction process, which was optimal during the Antarctic summer from December to February. The first step included on-site surveys of the hydrology, meteorology, geology, flora, fauna and ice conditions as well as mapping. The preliminary analysis helped to assess the feasibility and environmental impact of construction. After a comprehensive site selection process, an international environmental assessment report was submitted to the Antarctic governing bodies for approval.

Once international approval was obtained, the preparatory work began at home. It included detailed designing and planning, followed by assembling construction teams, and machinery and custom equipment for pre-assembly and inspection in China. Then the teams and materials were transported to Antarctica aboard ice-resistant vessels.

The final phase saw on-site assembly in Antarctica. The construction teams transferred the materials from ship to shore and completed the structural installation, system setup and operational testing within the limited weather window.

The three-phase construction strategy was meant to ensure that the Qinling Station is well-equipped to bolster Antarctic research efforts and provide a robust platform for scientific discovery and environmental monitoring in one of the most challenging and crucial research frontiers on the planet.

## Photo News



The Lantern Festival is a traditional Chinese festival celebrated on the 15th day of the first month of the lunisolar Chinese calendar. It falls on February 24 this year, marking the last day of Chinese New Year celebrations. During the Lantern Festival, children go out at night carrying paper lanterns and solve riddles on the lanterns. Lion dancing, walking on stilts, and dragon dancing are also popular activities during the festival.

In addition, people usually eat tangyuan or yuanxiao on this day, which is a sticky rice ball typically filled with sweet red bean paste, sesame paste or peanut butter. It's believed that the round shape of the balls symbolizes family togetherness, and that eating them can bring family harmony, happiness, and good fortune in the New Year.

Bright lanterns are demonstrated in Jincheng, Shanxi province, during the Lantern Festival. (PHOTO: VCG)