

# CONNECTION

The Official Newsletter of Zhejiang University

Issue 20

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FAHZU Headquarters Phase I put into use P.06

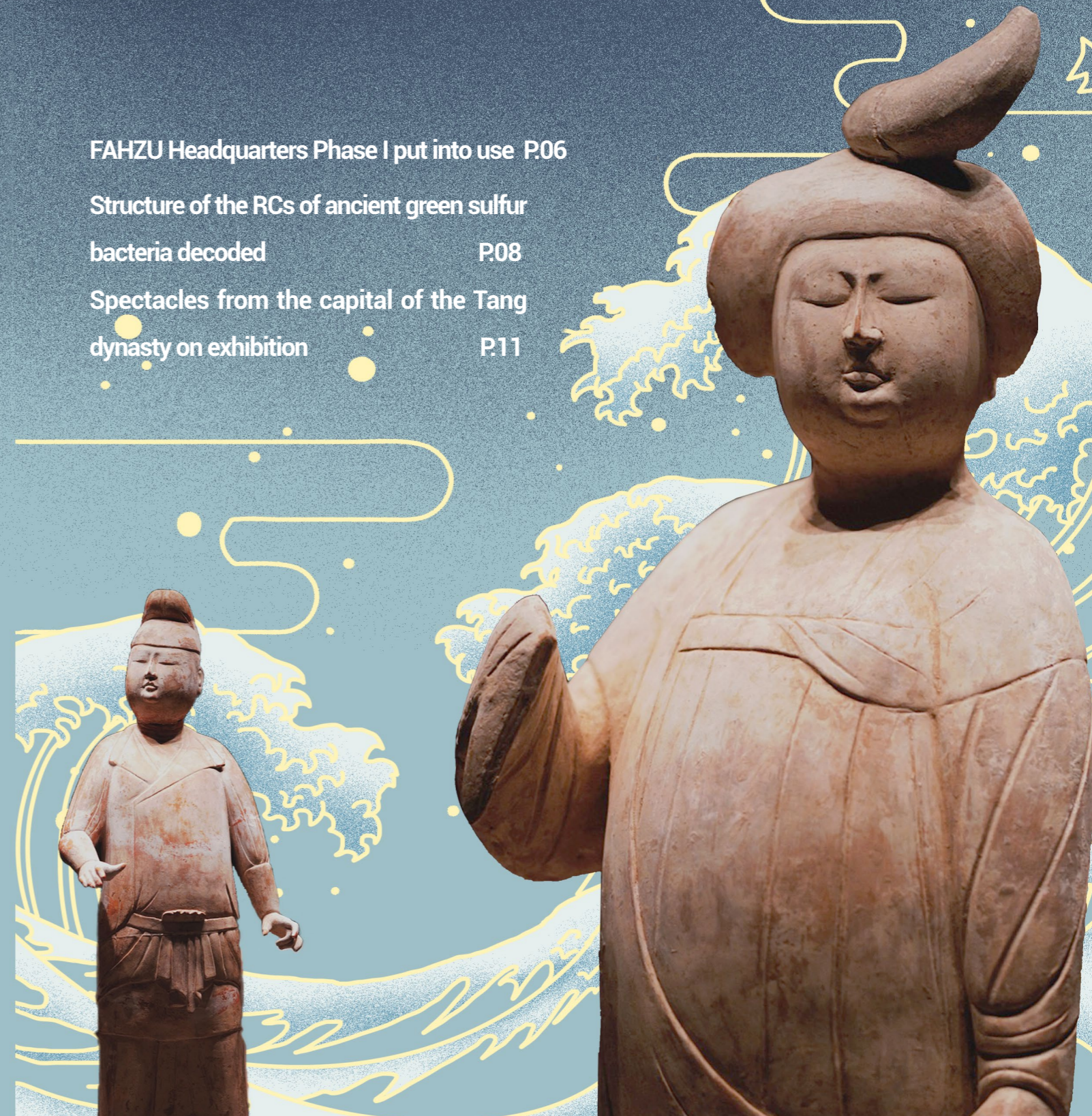
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*Seeking Truth  
Pursuing Innovation*



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## MESSAGE FROM THE EDITOR-IN-CHIEF

2020 has been a challenging year for many. Here in the 20th issue, we are pleased to share a roundup of ZJU's activities and achievements from the last two months of this year. You will find the breakthroughs ZJU researchers have recently made in plant science, brain science and pharmaceutical science. With great effort, we are one step closer to understanding the development of Alzheimer's disease and depression.

It's also worth mentioning that ZJU and the Cultural Relics Bureau of Xi'an City worked together to present the exhibition on "Metropolitan Life in Chang'an: Spectacles from the Capital of the Tang Dynasty", bringing magnificent artefacts to the ZJU community and introducing the state-of-the-art cultural heritage research.

As Chinese New Year is approaching fast, we wish you and yours a happy, healthy, and abundant 2021! As always, we'd love to hear from you!

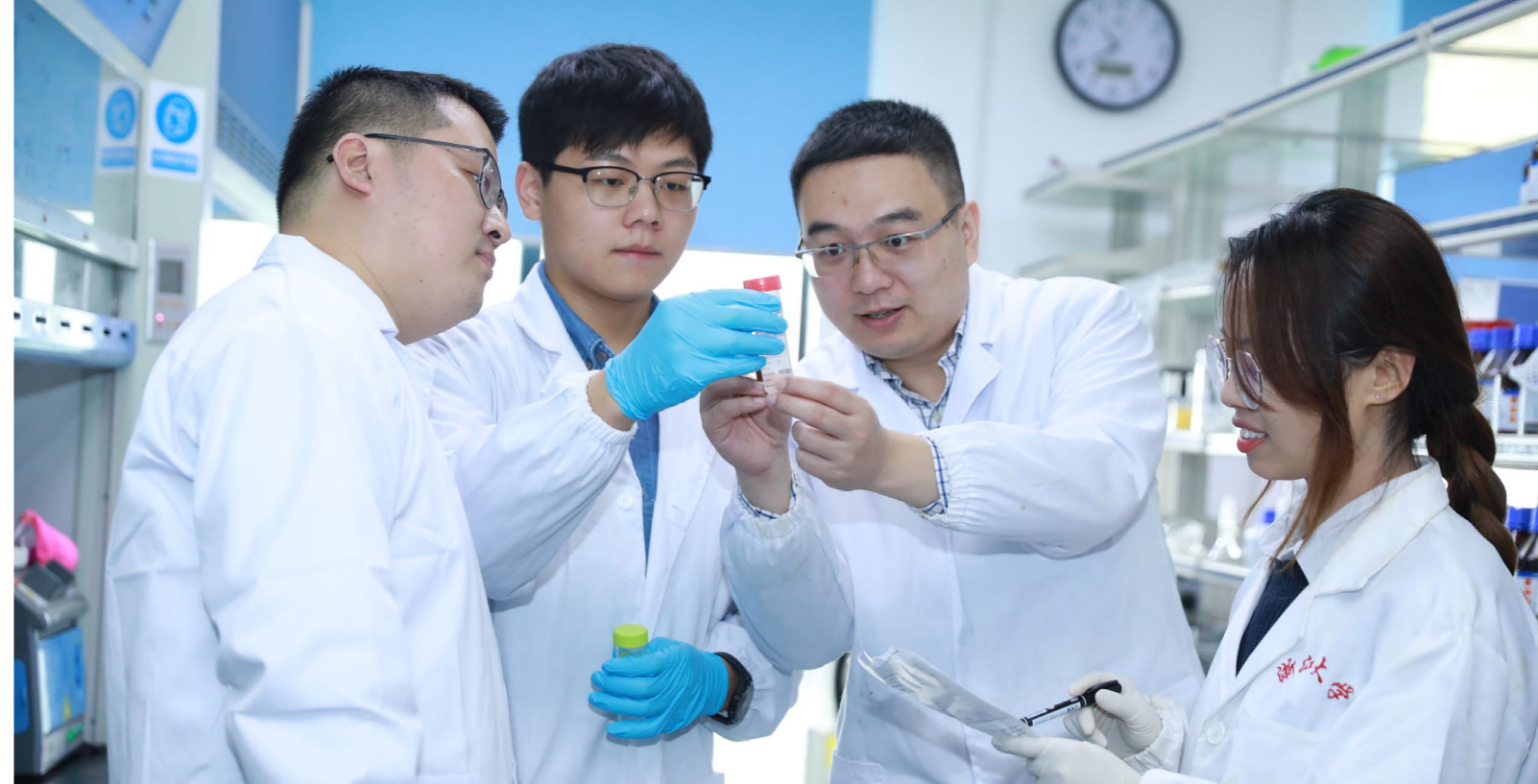


LI Min, Editor-in-Chief  
Director, Office of Global Engagement

**Editorial office :**  
Global Communications  
Office of Global Engagement, Zhejiang University  
866 Yuhangtang Road, Hangzhou, P.R. China 310058  
Phone: +86 571 88981259  
Fax: +86 571 87951315  
Email: newsletter@zju.edu.cn

**Edited by :**  
CHEN Weiying, HE Jiawen, Jiang Ziling

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# Z J U N E W S R O O M

## Research

**A glucose-responsive patch for smart delivery of insulin and glucagon**

An interdisciplinary team of researchers led by Prof. GU Zhen from Zhejiang University College of Pharmaceutical Sciences has developed a hybrid microneedle patch for glucose-responsive delivery of insulin and glucagon. Substituting the impaired  $\alpha$ -cells and  $\beta$ -cells, the patch is designated to mitigate the underlying hypoglycemia risk during diabetes treatment. A related study has recently been published in *PNAS*.

"This hybrid patch offers a strategy to solve the issues associated with frequent adjustment of insulin dosage during treatment. We will further test and optimize performance of our patch on animal models next," said Prof. GU Zhen.

**Pharmacological targeting of MCL-1 promotes mitophagy to treat Alzheimer's disease**

Previous studies have shown that a large number of damaged mitochondria exist in the brain cells of Alzheimer's patients and that mitochondrial dysfunction is closely related to the development of Alzheimer's disease (AD). On this basis, Prof. XIA Hong-guang's team proposed a hypothesis that the recovery of mitochondrial dysfunction may help cure AD. Their findings, recently published in the journal of *Nature Communications*, shed light on the mechanisms of mitophagy, revealing that MCL-1 is a mitophagy receptor that can be targeted to induce mitophagy, and identifying MCL-1 as a drug target for therapeutic intervention in AD.



## Research

### ZJU scholars provide a novel AKI kidney-targeted agent

After about two years' painstaking research, the research team led by Prof. DU Yongzhong from ZJU's College of Pharmaceutical Sciences developed an AKI kidney-targeted drug which can be precisely delivered, effectively released, intensively accumulated and permanently sustained, thereby laying a solid foundation for clinical translation. Their research findings have appeared in the journal of *Science Advances*.

### Sensory glia detect repulsive odorants and drive olfactory adaptation

The research team headed by Prof. KANG Lijun and the research team headed by Prof. DUAN Shumin from the Zhejiang University School of Brain Science and Brain Medicine engaged in collaborative research regarding olfactory adaptation. The study, published in *Neuron*, propose a novel two-receptor model where glia and sensory neurons mediate adaptive olfaction together.

## International

### International Campus held Annual Academic Convention 2020



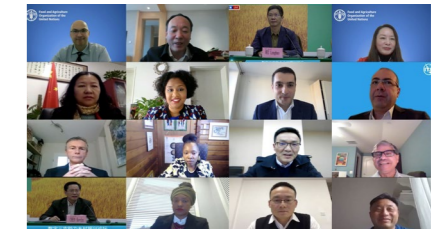
The Annual Academic Convention 2020 of International Campus was held on December 26, bringing together more than 300 faculty members and students. With the theme of "Embracing Diverse Disciplines, Shaping the Future", this year's convention aimed at promoting the innovation system and creating an ecosystem of innovative and cross-disciplinary research. The appointment of the 2nd Academic Affairs Committee was also announced at the convention.

### 36-hour Design Hackathon launched at ZJU



Co-hosted by the International Design Institute of ZJU and the Alibaba Design Committee, the 36H Design Hackathon was held on Zijingang Campus. This event, themed on "The Doomsday", covering five subjects: transportation, social networking, hobbies, traveling and shopping. It brought together over 90 students from five universities: Zhejiang University (China), Chiba University (Japan), Yonsei University (South Korea), Polytechnic University of Milan (Italy) and Singapore University of Technology and Design (Singapore).

### ZJU and FAO co-hosts Digital Agriculture Forum 2020



Aiming to foster an enabling ecosystem to accelerate the digital transformation of agri-food systems, the Digital Agriculture Forum 2020 was held on Dec. 5-6. The event was co-hosted by the Food and Agriculture Organization of the United Nations (FAO) and ZJU. More than 300 people out of 900 registered from over 80 countries participated in the two-day webinar for mutual learning.

At the Forum, ZJU and FAO jointly released the first "Digital Agriculture Flagship Report", which systematically elaborates on the current development status of China's rural e-commerce from the international perspective.



## Public Engagement

### FAHZU Headquarters Phase I opens on its 73rd anniversary

On Nov. 1, the first-phase facility of the headquarters of the First Affiliated Hospital of the Zhejiang University School of Medicine (FAHZU) was officially put into use on the 73rd anniversary of the founding of FAHZU. It took six years to complete the construction of the first-phase facility, which covers an area of approximately 33 acres. It has 1,500 beds and has a capacity of 8,000 outpatient visits on a daily basis.

### ZJU joins hands with Alibaba Cloud to launch "SmartCloud Scientific and Educational Alliance"

On Nov. 20, ZJU and Alibaba Cloud unveiled the fruits of "SmartCloud Laboratory" at the Digital and Intelligent Education Summit. A series of innovative platforms designed by the lab, such as "research@ZJU", "learning@ZJU", "SmartCloud Classrooms" and "ZJU DingTalk", have realized "cloud" teaching, research, administration and life at the University.

On the same day, ZJU, Alibaba Cloud, 11 other universities and 12 other en-

terprises announced the establishment of "SmartCloud Scientific and Educational Alliance" in an effort to promote the digitalization of universities, accelerate research innovation, facilitate teaching and learning anytime and anywhere, and propel lifelong education.

### ZJU-Angelalign Research & Development Center for Intelligent Healthcare launched at the ZJUI

ZJU-Angelalign Research & Development Center for Intelligent Healthcare was set up at Zhejiang University/University of Illinois at Urbana-Champaign Institute (ZJUI) on Dec.9. It is aimed to harness the cutting-edge technologies of artificial intelligence and machine learning to conduct cross-disciplinary research and develop a new generation of technologies and standards for intelligent diagnosis and manufacturing in the dental healthcare.

## In the Media

### Multi-Expert Learning Architecture (MELA), A Method to Combine Deep Neural Networks

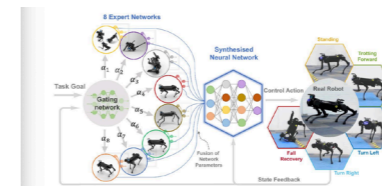


Fig. 2. Multi-Expert Learning Architecture (MELA): a hierarchical deep reinforcement learning framework that generates adaptive behaviour by combining multiple deep neural networks (DNNs) together to produce versatile locomotive skills. The Gating Neural Network (GNN) generates variable weights ( $w_i$ ) to fuse the parameters of all eight expert networks (each expert is specialized by its primary motor skill), such that newly synthesized motor skills are adapted to different locomotion modes by blending useful learned behaviours collectively from the consortium of experts.

Researchers at the University of Edinburgh and Zhejiang University have revealed a unique way to combine deep neural networks (DNNs) for creating a new system that learns to generate adaptive skills. Scientists have combined several DNNs developed for different applications to create a new system with the advantages of all of its constituent DNNs. The reports state that the new system is not only the sum of its parts, but it is also capable of learning new functions that no DNN was able to do alone. Therefore, it is termed as a multi-expert learning architecture (MELA) that gets adaptive skills from a combination of representative expert skills. (Marketechpost)

### Distinct Microbiome and Metabolites Linked with Depression

The human gut microbiome is a world in miniature, populated by a chatty community of bacteria, viruses, fungi, and protozoa nestled within various gastrointestinal niches. Over the past decade, researchers have linked disturbances within this complicated microbial society to a variety of diseases. Major depressive disorder (MDD) is one such condition, but the studies have been small and the findings imprecise. A study published December 2 in *Science Advances* changes all that with its vivid description of a distinct microbiome associated with major depressive disorder, as well as the profile of molecules these organisms produce. The researchers were able to use this microbial "fingerprint" to distinguish between individuals with MDD and healthy controls, solely on the composition of a few microbes and compounds in their fecal matter. (TheScientist)

# RESEARCH HIGHLIGHTS



## Scientists successfully decode the structure of the RCs of ancient green sulfur bacteria

Green sulfur bacteria (GSB) are part of the family of photosynthetic bacteria that can perform anaerobic photosynthesis by acquiring electrons from such substances as hydrogen sulfide, colloidal sulfur, and sodium thiosulfate.

The research team led by Prof. ZHANG Xing from Sir Run Run Shaw Hospital of Zhejiang University School of Medicine and Center of Cryo-Electron Microscopy revealed the structure of the FMO-GsbRC supercomplex for the first time in the world. Their findings were published in the journal of *Science* on Nov. 20.

"With this structure, we now have a complete set of structures from different groups of photosynthetic organisms, allowing them to examine the evolution of photosystems in greater detail. By revealing the arrangement of proteins and pigments, including features of both type I and II RCs, the structure provides valuable insight into how extant members of this family of proteins diverged from a common RC ancestor," said ZHANG Xing.



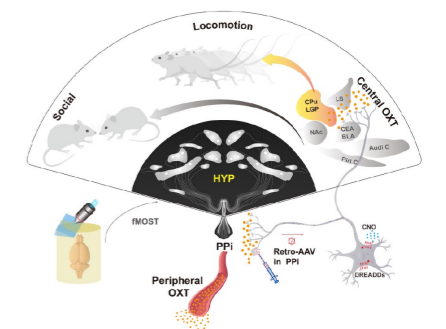
## Scientists reconstruct the architecture of the HNS

Using viral tracing and whole-brain imaging, the research team led by Prof. DUAN Shumin and Prof. GAO Zhihua from the School of Brain Science and Brain Medicine reconstructed the three-dimensional architecture of the hypothalamo-neurohypophysial system (HNS) and observed collaterals of hypothalamic magnocellular neuroendocrine cells (MNCs) within the brain.

By dual viral tracing, the team further discovered that subsets of MNCs collaterally project to multiple extrahypothalamic regions. Selective activation of magnocellular oxytocin neurons promotes peripheral oxytocin release

and facilitates central oxytocin-mediated social interactions, whereas inhibition of these neurons elicits opposing effects. These research findings were published in *Neuron*.

"Our work reveals the previously unrecognized complexity of the HNS and provides structural and functional evidence for MNCs in coordinating both peripheral and central oxytocin-mediated actions, which will shed light on the mechanistic understanding of oxytocin-related psychiatric diseases," DUAN Shuming said.



# SPOTLIGHT ON

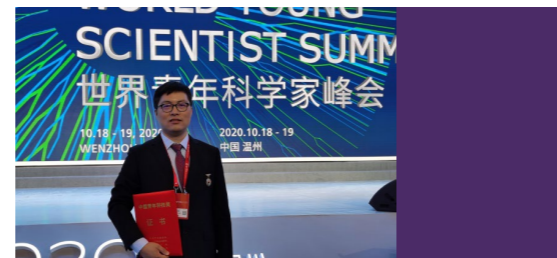
## FACULTY

### Prof. XU Haijun won the 16th China Youth Science and Technology Award

Planthoppers are a typical insect with wing morphism. The scientific community has been baffled by the question as to what factors contribute to the diverse wing morphs of insects for more than half a century.

Since 2011, Prof. XU Haijun from ZJU's College of Agriculture and Biotechnology has been working on the mechanism of rice pests and the evolutionary developmental biology. "Science is in essence to solve problems, and it is curiosity that acts as a strong motivator" said XU.

Prof. XU led his team to discover two insulin receptors which can regulate the development of short or long wings in planthoppers and propose the insulin signaling pathway which serves as an ideal model for studying wing developmental plasticity in insects. This research represents a milestone in the study of the molecular mechanism of wing polymorphism and complements the theoretical flaw in evolutionary developmental biology. Recently, XU won the 16th China Youth Science and Technology Award in recognition of his outstanding contributions to the field of science in China.



# CAMPUS

### Exhibition on "Metropolitan Life in Chang'an: Spectacles from the Capital of the Tang Dynasty" launched at ZJU

The exhibition themed on "Metropolitan Life in Chang'an: Spectacles from the Capital of the Tang Dynasty" kicked off in Zhejiang University Museum of Art and Archeology on December 1. A selection of 167 artefacts intimately related to the daily life of Chang'an residents were on display, unfolding a scroll of their lively and dynamic life. The audience is thus ushered into the ancient capital of the Tang Dynasty to relive the daily life of the ancient China at its zenith.



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Zhejiang University has long been committed to strategic cooperation with various cities and provinces. It has signed strategic cooperation framework agreements with the Cultural Relics Bureau of Shaanxi Province, Xi'an Municipal People's Government and the Cultural Relics Bureau of Xi'an City, in an effort to multiply resource sharing and utilization in regard to cultural heritage research, education and preservation.

**HUANG Xianhai,**  
Vice President of ZJU

We co-organize the exhibition in the hope of introducing to the general public the state-of-the-art research into the civilizations of the Zhou, Qin, Han, and Tang dynasties, telling the story behind cultural relics, and disseminating ancient China's fascinating traditional culture.

**YU Hongjian,**  
Director of Xi'an Museum