

InFocus | COSPAR Honors CAS Physicist



Image credit: NSSC

CAS Physicist WU Ji received the COSPAR International Cooperation Medal on July 18 in Athens, as a recognition of his outstanding contributions to space science and related international cooperation. Meanwhile, minor planet No. 10118, discovered in October 1992 and previously known as “1992 UK₁”, was renamed after him as “Jiwu”.

WU played an instrumental role in the cooperation between China and Europe as a coordinator for the Double-Star program, China’s first space science satellite. The ensuing years saw him initiate and advocate a series of grand programs in space science, including the ongoing Strategic Priority Program on Space Science (SPPSS) sponsored by CAS. Under the SPPSS framework, SMILE, the “Solar wind Magnetosphere Ionosphere Link Explorer”, extends the cooperation between China and Europe to a new level.

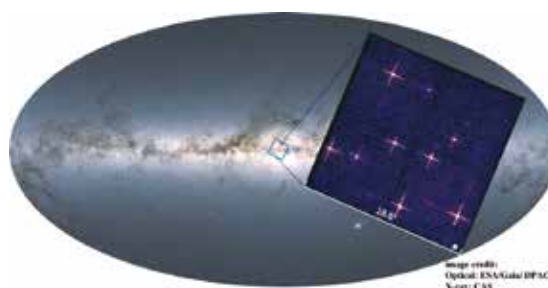
Read more from page 137.

InFocus | First Wide-Field Snapshots of X-ray Universe

The astronomical community has awaited a truly wide-field-of-view X-ray focusing imager for decades. Now the first results from a test flight, in excellent quality and consistency with previous simulations, herald the arrival of a powerful X-ray focusing imager of an unprecedentedly wide field-of-view.

These results, including an 800-second X-ray “time-lapse photography” of a region of the Galactic center, are given by a test module for the wide-field X-ray telescope to be installed on an astronomical satellite named Einstein Probe (EP). This marks the first real wide-field X-ray imager for X-ray surveys and monitoring since the first detection of X-ray signals from the depth of the universe 60 years ago. The future telescope, set for launch by the end of 2023 aboard EP, will help astronomers explore open questions in time-domain astrophysics.

For detail, see page 140.



Highlights | Fuse Chromosomes in Mice



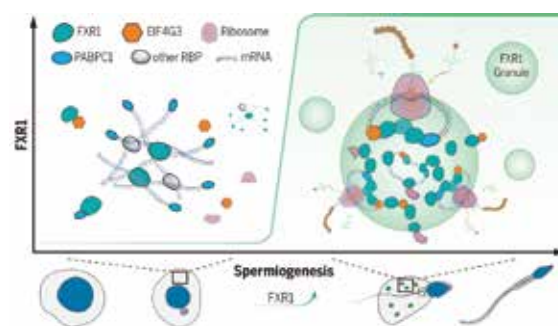
Scientists successfully fused two chromosomes head-to-head in mice, resulting in the mice carrying 19 pairs of chromosomes instead of the usual 20. They found that the mice are robust in dealing with this sort of chromosomal rearrangements that are considered a major force fueling species’ evolution. They also found that mating mice with 19 pairs of chromosomes and 20 pairs can produce fertile offspring. In other words, the establishment of reproductive isolation was not instant. To find out more, please turn to page 144.

An artwork illustrates chromosome fusion in mice. (Credit: GU Deng-er)

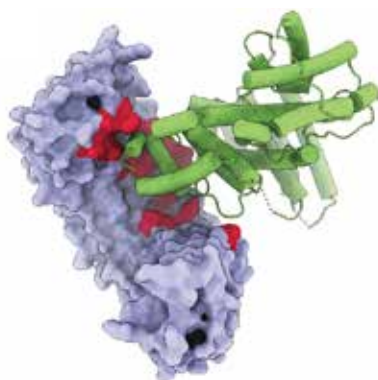
Highlights | Pin Down Key Protein for Male Fertility

Chinese researchers pinpoint an RNA-binding protein called FXR1 as the key to wake up the dormant mRNAs required for late sperm maturation in mice, which may shed light on how to reverse male infertility in humans. For more details, turn to page 148.

FXR1-containing granules (membraneless biomolecular condensates) mediate translation activation and spur late sperm maturation in mice. (Image by CEMCS)



Highlights | Disease-resistant Crops Looming on the Horizon



How plants recognize pathogens and fight back is a mystery that has not been fully understood for a long time. Published in *Nature* on September 26, a joint team revealed that the nucleotide-binding leucine-rich repeat (NLR) receptors, the most prominent family of plant immune receptors, are activated by pathogen-derived molecules known as effectors. The team also demonstrated the feasibility of tweaking the receptor-effector interfaces of non-functional homologous proteins from other plants and granting them disease-resistant phenotypes. For more details, turn to page 150.

The interface between the wheat disease resistance receptor protein (purple) and the effector (green). (Image by Förderer, A. *et al.*, *Nature*.)

Highlights | COVID-19 Pandemic and Lessons for Future

The COVID-19 pandemic has exposed the necessity of being prepared for future outbreaks of emerging pathogens, as emphasized by Prof. George F. Gao, a well-known virologist and immunologist at the Institute of Microbiology of the Chinese Academy of Sciences. In an article published in *The Lancet* on August 4, Gao highlights the importance of a prompt and public-involved response strategy and stresses the need for improved public understanding and involvement in future pandemics. Gao also acknowledges the misinformation and false information spread during the COVID-19 pandemic, emphasizing the need for joint efforts to control both the pandemic and the infodemic. He believes that the truth about the origin of COVID-19 should be determined by science and honesty, not speculation. For more details, turn to page 152.



An art illustration of the SARS-Cov-2 virus and vaccine (Source: Pixabay)

Highlights | New Antibiotics Delivery Method Improves Gut Homeostasis



The taking of antibiotics often leads to loose bowels due to damaged gut homeostasis. Things may take a turn when loading these drugs within particular nanoparticles that navigate to the site of infection. (Source: Pixabay)

A new study published in *Nature Biomedical Engineering* on July 7 shows that positively charged and glycosylated nanoparticles (PGNPs) can be used to improve the effectiveness of antibiotics in treating bacterial infections without damaging the gut microbiome. Researchers from the University of Science and Technology of China created capsules made of PGNPs that target the small intestine’s sodium-dependent glucose transporter 1 (SGLT1) and improve the bioavailability of antibiotics. This method reduces negative side effects and improves effectiveness by allowing more medication to be absorbed into the body and reach the site of infection. The study shows that this new delivery method could help sustain or restore gut homeostasis and reduce exposure to gut bacteria, thereby lowering the accumulation of antibiotic-resistant genes. For more details, turn to page 154.

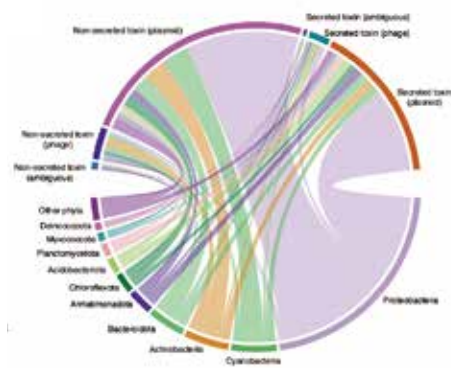
Highlights | D3 Peptide Could be a Safer Prescription for Obesity

As reported in *Gut* on July 8, researchers from the Beijing Institutes of Life Science have discovered a potential solution for obesity by taking D3, a 9-amino-acid peptide derived from human defensins. The peptide can reduce appetite, increase the production of hormones that signal fullness, and boost gut bacteria that combat obesity by reducing the amount of fat absorbed by the body. In animal studies, D3 reduced weight by up to 12% in eight weeks without any significant side effects. Additionally, the study suggests that D3 can enhance the abundance of weight-loss gut bacteria, making it a safer alternative to many FDA-approved drugs. Further research is needed, but the findings offer promising potential for a new treatment option for obesity and related metabolic disorders. Clinical trials on humans are set to begin as early as next year. For more details, please turn to page 155.



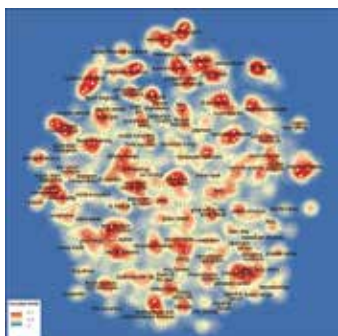
A 9-amino-acid peptide, namely D3, could be a safer prescription for obesity in the future, a new study shows. (Source: Pixabay)

Highlights | Archiving the Genomic and Genetic Resources of Glaciers



Glaciers on the Qinghai-Tibet Plateau host a wide diversity of microorganisms, including species found nowhere else, says a new study in *Nature Biotechnology* on June 27. LIU *et al.* from Lanzhou University and the Institute of Microbiology of the Chinese Academy of Sciences have generated a genome and gene catalog of glacier microbiomes by gathering bacteria and archaea from 21 glaciers on the Qinghai-Tibet plateau. For more details, turn to page 156.

41% of identified toxin genes are linked to mobile genetic elements (phages and plasmids), raising the concern of rapid release of toxin genes during glacier melting. (Image by LIU *et al.*)

InDepth | China Is Changing the Global Scientific Landscape

A science structure map of the world in 2014~2019 based on clusters of highly cited papers. (Image by RGSSM)

China's basic research has undergone rapid development, significantly impacting the global scientific landscape, according to the Research Group of Science Structure Map (RGSSM) at the Institutes of Science and Development of the Chinese Academy of Sciences. Through comparison and analysis of research output, cooperation, and strengths in global hot research fronts and various subjects in 2010~2015 and 2014~2019, RGSSM was able to identify research areas of China's strengths and weaknesses and provide guidance for identifying priority research fields, strategic focus, and science and technology policies in China. For more details, please turn to page 158.