



# WIV NEWSLETTER

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## Trends and Policy

### Chinese Premier proposes to upgrade China-Africa cooperation in six areas



Premier Li Keqiang proposes to upgrade China-Africa cooperation in the area of industry, finance, poverty reduction, ecological protection, people-to-people exchanges, and peace and security in his speech delivered at the headquarters of the African Union. Stressing that ecological protection is a shared responsibility of all humanity, Li said the Chinese government will provide Africa with 10 million dollars of free aid for wild life preservation, promote joint research in protecting biological diversity, preventing and controlling desertification and promoting modern agriculture, and facilitate the construction of **Sino-Africa Joint Research Center, CAS, which is one of the projects shouldered by WIV.**

## Sensational Beats

### Progress in antiviral peptide targeting Japanese encephalitis virus (JEV) entry

Recently, the research team led by Pro. Xiao Gengfu from WIV, CAS, has identified a 12-peptide P3 which inhibited Japanese encephalitis virus (JEV) infection of BHK-21 cells by interfering with viral attachment to host cells.

A phage display peptide library was panned against E DIII of JEV envelope protein, which plays an important role in the interaction of viral particles with host cell receptors, resulted in the identification of several peptides. One peptide, named P3, inhibited JEV infection of BHK-21 cells with an IC<sub>50</sub> of ~1 μM and an IC<sub>90</sub> at ~100 μM. Further characterization revealed that P3 bound to E DIII with a KD of 6.06×10<sup>-6</sup> M and inhibited JEV infection by interfering with viral attachment to cells. Based on in silico prediction by ZDOCK, P3 was found to interact with E DIII via a hydrophobic pocket, which was confirmed by the binding assay of P3 to the V357A mutant. P3 was hypothesized to bind to E DIII by interacting with the sties adjacent to the BC and DE loops, which might interfere with the binding of JEV to cellular receptors, thus impeding viral infection. This newly isolated peptide may represent a new therapeutic candidate for treatment of JEV.



Prof. Xiao Gengfu

### Progress in molecular imaging

The research team led by Prof. Cui Zongqiang from Analytical Microbiology and Nano-biology Center in WIV, and Prof. Zhang Xian-En from IBP, recently developed novel far-red mNeptunebased bimolecular fluorescence complementation (BiFC) and trimolecular fluorescence complementation (TriFC) systems with excitation and emission above 600 nm in the 'tissue optical window' for imaging protein-protein and RNA-protein interactions in live cells and mice. With these new fluorescence complementation systems, an interaction between PTB and the 3' long terminal repeat region of HIV-1 mRNAs was found and imaged in live cells and mice, implying a role for PTB in regulating HIV-1 mRNA processing. The results have been published in *Nucleic Acids Research*. The research provides new tools for in vivo imaging of RNA-protein and protein-protein interactions, and adds new insight into the mechanism of HIV-1 mRNA processing in HIV activation from latency.



Prof. Cui Zongqiang

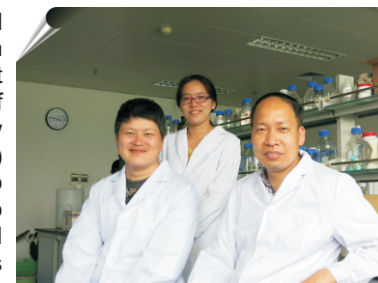


Prof. Deng Jiaoyu

The Analytical Microbiology and Nano-biology Center, which is headed by Prof. Jiaoyu Deng and Prof. Cui Zongqiang, is one of the five centers of WIV. The objective of the center is to develop ultra sensitive, high-throughput, rapid, real-time and in vivo analytical technologies for solving fundamental scientific problems of pathogen microbiology/virology and meeting the needs of clinical diagnosis. In recent years, their pioneer researches on bridging nanotechnology and virology create novel analytical tools for fundamental research of human pathogens and clinical diagnostics.

## New strategy for rapid drug susceptibility test

The research team led by Prof. Wei Hongping recently published three research papers in Journal of Clinical Microbiology on drug susceptibility tests using a new strategy named as gene-to-protein function (GPF) they proposed. "The most significant advantage of the GPF strategy is that it detects the drug susceptibility through the function of the proteins synthesized in vitro instead of the individual mutations in the susceptibility-related genes.", said by Prof. Wei. Base on this new strategy, Li Hen, the PhD student in the team, has developed a rapid pyrazinamide (PZA) susceptibility test of Mycobacterium Tuberculosis directly from sputa, which can be finished in two days. While the time needed in the current PZA susceptibility tests ranges from a few weeks to months. Two other PhD students in the team, Huang Li and Qiao Jingjuan, have successfully used the GPF strategy to detect the functional variants of NDM-1 and the protease inhibitor's susceptibility of Hepatitis C virus, respectively. The good results obtained so far indicate that the GPF strategy could offer helps to overcome the antimicrobial resistance, which is becoming a serious health threats as revealed recently in the WHO's "Antimicrobial Resistance Global Report 2014".



Prof. Wei Hongping (right) with his PhD students Li Hen (left) and Huang Li (middle).

## Progress and Innovation

### Ten Thousand Talent Program: Millions of Leading Engineering Talents



Prof. Hu Zhihong

On 26 Feb., 2014, Prof. Zhihong Hu from WIV was awarded Ten Thousand Talent Program: Millions of Leading Engineering Talents authorized by Organization Department, Communist Party of China Central Committee, just as Prof. Yanyi Wang, who won Ten Thousand Talent Program: Top-notch Young Talents of Organization Department, Communist Party of China Central Committee in July, 2013. Ten Thousand Talent Program, which provides high-caliber talents with special R&D funds and favored policies, especially for those making contributions to strategic emerging industries, basic research areas, and national key research areas, enjoys a high reputation in China.

Focusing on systematic virology, including virus classification and evolution, functional genomics, metagenomics, proteomics, population genetics, viral-host interactions as well as synthetic biology, Prof. Zhihong Hu is a principle investigator of the projects funded by NSFC (the National Science Foundation of China) and MOST (the Ministry of Science and Technology), publishing over 130 research papers, including 80 SCI-indexed articles, 13 monographs (or chapters), and 11 authorized

patents.

### The Young Scientist Subject

Recently, an application titled "Development of novel anti-tumor nanoantibody based on antibody constant CH2 domain" proposed by Prof. Rui Gong was officially approved by "The Young Scientist Subject" in the field of biological and pharmaceutical technology, National High Technology Research and Development Program of China (863 Program), which was initiated by the Ministry of Science and Technology in 2013. To cultivate young top-notch talents with global vision and competitiveness, "The Young Scientist Subject" provides funds to the young scientists with excellent innovation capacity who are below 35 years old. It is only forty-five applicants who were awarded after the strict selection from 1000 applicants, leading to less than 5% winning ratio. The goal of Prof. Gong's proposal is to develop nanoantibody targeting mesothelin as novel therapeutic candidate for treatment of tumor in clinic.

The Antibody Engineering Group led by Prof. Gong focuses on engineering of antibodies including development of nanoantibodies against viruses, tumors and other pathogens based on scaffold derived from antibody Fc CH2 domain for clinic use. This group tries to elucidate the basic questions in virology, oncology and other related-field (e.g., understand the mechanism of virus-host interactions), and solve several difficulties for improvement of the yield of protein-related drugs (e.g., increase the efficiency of correct folding of proteins) during the research and development of therapeutic antibodies.



Prof. Gong Rui

## Collaboration and Exchange

### The 8th Coordination Meeting of Sino-French Emerging Infectious Diseases Prevention and Care Project

On 29th April, 2014, The 8th Coordination Meeting of Sino-French Emerging Infectious Diseases Prevention and Care Project, on which the schedule and progress of the laboratory construction were reported, the difficulties and solutions were discussed, and further plans for the laboratory construction were discussed in details.

Based on the Sino-French comprehensive strategic partnership framework, Wuhan Zhengdian Laboratory is one of the most significant cooperative projects in the fields of hygiene, public health, science and technology, which has caught the attention of the governments of the two nations. It is urgent to deal with biosecurity issues. The development of High Security Bio-containment Facilities will lay a solid sci-tech foundation for the establishment of bio-security system.

It is believed that Wuhan Zhengdian Laboratory, the model of Sino-French strategic cooperation, will be established in the near future, which will make great contributions to Sino-French cooperation in hygiene and offer a gift for the 50th anniversary of Sino-French diplomatic relationship.

