



## Spotlight

# The French Ambassador to China bestowed medals on Two Scientists in Wuhan Institute of Virology

On June 16th 2016, Mr. Maurice GOUTRDAULT, the French Ambassador to China, representing the President of France, bestowed the medal of Knight of the National Order of Merit (French: Chevalier de L'Ordre National du Mérite) and the medal of Knight of the Order of Academic Palms (French: Chevalier dans l'Ordre des Palmes académiques) on Professor Zhiming Yuan and Professor Zhengli Shi respectively in Wuhan Institute of Virology (WIV), Chinese Academy of Sciences (CAS).

On the award ceremony, Mr. Maurice GOUTRDAULT, on behalf of the French government, conveyed his warm congratulations and appreciation for the prominent contributions made by Prof. Yuan, Prof. Shi and their team in promoting the Sino-French cooperation on prevention and control of emerging diseases and in building the Sino-French Biosafety Level 4 Laboratory (Wuhan P4 Laboratory). In recent years, focusing on the construction of Wuhan P4 Laboratory, China and France have collaborated closely and achieved rather good effects in biosafety laws, regulations and standard construction, prevention and control of emerging diseases and personal training. Mr. Goutrdault highly commended the positive contributions made by China in Sino-French cooperation project. In future, the French Government will actively

coordinate the succeeding activities like operating maintenance and personal training in Wuhan P4 Laboratory, so as to improve the broader and deeper cooperation and exchanges in public health between our two nations.

The National Order of Merit was established in 1963, under Charles de Gaulle. It was instated as a unification of a great many national orders across numerous fields, such as trade, tourism and the postal service. The National Order of Merit replaced these many awards with one award, which recognizes distinguished individuals regardless of gender, nationality or background that make significant contributions to help France to develop good foreign relations. The French Academic Palms recognizes those who have rendered eminent service to French education



## Spotlight

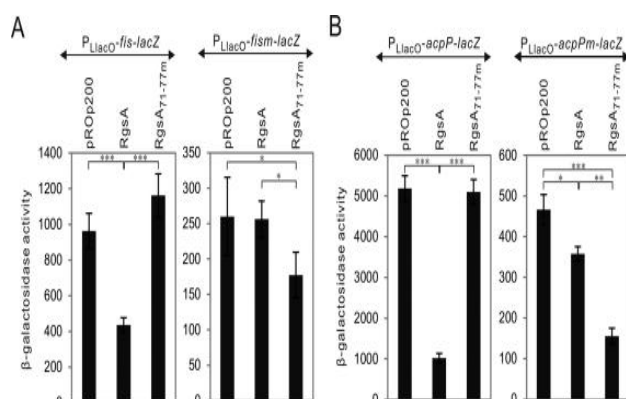
and have contributed actively to the prestige of French culture. It is the oldest non-military French decoration and the highest honor in French culture and education.

The award ceremony coincided with the Sino-French Biosafety Level 4 Laboratory handover ceremony. This moment of honor was witnessed by Mr. Jinghua Cao, the Director General of Bureau of International

Cooperation, CAS, Mrs. Guilan Song, the Deputy Director of CNAS, representatives from NHFPC and Ministry of Foreign Affairs, Mr. Xinwen Chen, the Director General and Mrs. Yanyi Wang, the Deputy Director General in WIV, Mr. Philippe Max MARTINET, the Consul General of France to Wuhan and Mr. Jean-Michel HUBERT, the National Coordinator for the Sino-French 2004 Agreement.

## Research Progress

## RpoS-dependent sRNA RgsA regulates Fis and AcpP in *Pseudomonas aeruginosa*



**R**gsA is a phylogenetically conserved small regulatory RNA (sRNA) in *Pseudomonas* species. This sRNA has been shown to be directly controlled by the major stationary phase and stress sigma factor  $\sigma$ S (RpoS), and also indirectly regulated by the GacS/GacA two-component system. However, the role and the regulatory targets of this sRNA remain unclear.

Here, the research group led by Professor Shiyun Chen in WIV found that two direct regulatory targets of RgsA, the mRNAs coding for the global transcriptional regulator Fis and the acyl carrier protein

AcpP, were identified in *P. aeruginosa*. RgsA downregulates the synthesis of Fis and AcpP by base-pairing, and this regulation requires the RNA chaperone protein Hfq. Alignment of RgsA homologs in *Pseudomonas* revealed a conserved core region, which is strictly required for RgsA target recognition. Specifically, RgsA inhibits *fis* expression via an 11 + 11 bp RNA duplex, whereas this interaction region is not sufficient for repression and the 35 nt downstream region is also required. Interestingly, two functional start codons initiate *fis* mRNA translation and both are repressed by RgsA. Furthermore, deletion of *rgsA* significantly increased swarming motility in *P. aeruginosa*.

Together, this study suggests a novel regulatory role of sRNA in which the versatile transcriptional regulator Fis and the stress regulator RpoS are connected by RgsA.

Link: <http://onlinelibrary.wiley.com/doi/10.1111/mi.13458/full>



## Research Progress

## Scientists in WIV Observed the Sequential Disassembly Process of Single HIV-1 Virus Particles in Live Host Cells

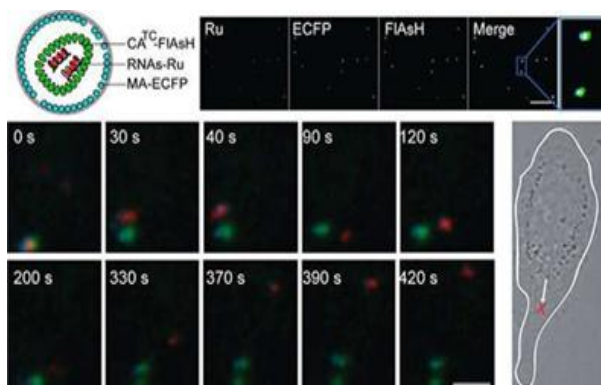
**O**n June 2nd 2016, the study jointly developed by the research teams led by Professor Zongqiang Cui in WIV, Professor Xianen Zhang in Institute of Biophysics, CAS and Professor Zhike He in Wuhan University was published online by the ACS Nano journal. The research paper (DOI: 10.1021/acsnano.6b02462) first demonstrates the real-time imaging of single HIV-1 disassembly with multicolor viral particles.

Viral disassembly is poorly understood and related to the infection mechanism. However, directly observing the process in living cells remains technically challenging. In this study, the genome RNA, capsid, and matrix protein of the HIV-1 virus were labeled with a Ru(II) complex ([Ru(phen)<sub>2</sub>(dppz)]<sup>2+</sup>), the TC-FIAsH/ReAsH system, and EGFP/ECFP, respectively. Using the multicolored virus and single-particle imaging, the scientists were able to track the sequential disassembly process of single HIV-1 virus particles in live host cells. Approximately 0.1% of viral particles were observed to undergo a sequential

disassembly process at 60–120 min post infection. The timing and efficiency of the disassembly were influenced by the cellular factor CypA and reverse transcription.

In this study, the real-time dynamic analysis on disassembly process of single HIV-1 virus particles in live host cells is first carried out. The findings facilitate a better understanding of the processes governing the HIV-1 lifecycle. The multicolor labeling protocol developed in this study may find many applications involving virus–host-cell interactions.

Link: <http://pubs.acs.org/doi/abs/10.1021/acsnano.6b02462>



## WIV First Illustrated a Mechanism for $\sigma^E$ in Response to Oxidative Stress through Regulation of *rbpA* Transcription

**M**ycobacterium tuberculosis adopts various strategies to cope with oxidative stress during infection. Transcriptional regulators, including  $\sigma$  factors, make important contributions to this stress response, but how these proteins cooperate with each other is largely unknown.

In the study (DOI: 10.1111/mmi.13449), the role of RbpA and its cooperation with  $\sigma$  factors in response to oxidative stress are investigated by the Pathogenic Bacteria Group under the leadership of Professor Shiyun Chen in WIV. Knock down expression of *rbpA* in *Mycobacterium smegmatis* attenuated



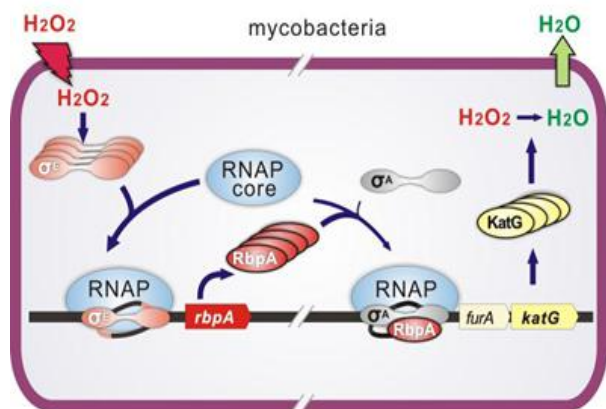
## Research Progress

bacterial survival in the presence of H<sub>2</sub>O<sub>2</sub>. Additionally, transcription of the *rbpA* gene was induced by H<sub>2</sub>O<sub>2</sub> in a  $\sigma^E$ -dependent manner. After induction, RbpA interacts with the principal sigma factor,  $\sigma^A$ , to control the

transcription of *furA-katG* operon, which encodes an H<sub>2</sub>O<sub>2</sub> scavenging enzyme. Moreover, this regulation is responsible for the role of  $\sigma^E$  in oxidative response because bacterial survival was attenuated and transcription of the *furA-katG* operon was down-regulated with H<sub>2</sub>O<sub>2</sub> treatment in  $\Delta\text{sigE}$  deletion mutant ( $\Delta\text{sigE}$ ), and over-expression of RbpA in  $\Delta\text{sigE}$  strain restored all of these phenotypes.

Taken together, their study first illustrated a mechanism for  $\sigma^E$  in response to oxidative stress through regulation of *rbpA* transcription. This study was also the first to demonstrate that RbpA is required for the full response to oxidative stress by cooperating with the principal  $\sigma^A$ .

Link: <http://onlinelibrary.wiley.com/doi/10.1111/mmi.13449/full>

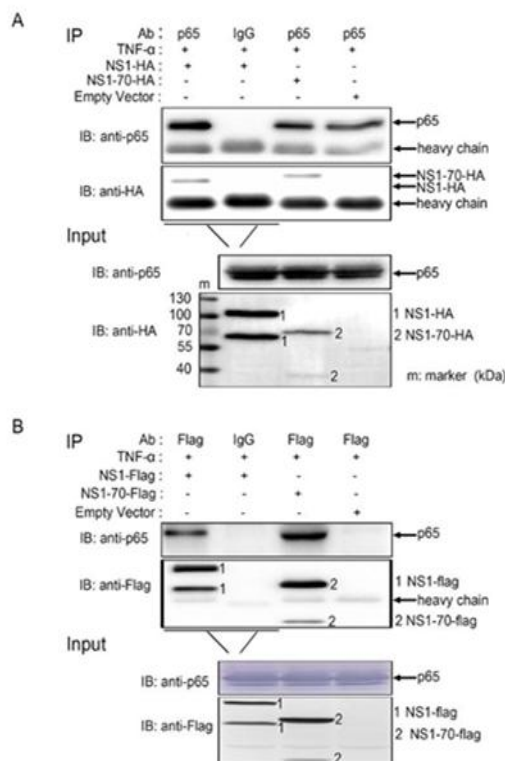


Oxidative stress responses in mycobacteria

## Human Bocavirus NS1 and NS1-70 Proteins Inhibit TNF- $\alpha$ -Mediated Activation of NF- $\kappa$ B by targeting p65

Human bocavirus (HBoV), a parvovirus, is a single-stranded DNA etiologic agent causing lower respiratory tract infections in young children worldwide. Nuclear factor kappa B (NF- $\kappa$ B) transcription factors play crucial roles in clearance of invading viruses through activation of many physiological processes. Previous investigation showed that HBoV infection could significantly upregulate the level of TNF- $\alpha$  which is a strong NF- $\kappa$ B stimulator.

The research group led by Professor Hanzhong Wang in WIV investigated whether HBoV proteins modulate TNF- $\alpha$ -mediated activation of the NF- $\kappa$ B signaling pathway. They showed that HBoV NS1 and NS1-70 proteins blocked NF- $\kappa$ B activation in response to TNF- $\alpha$ . Overexpression of TNF receptor-associated factor 2 (TRAF2)-, I $\kappa$ B kinase alpha (IKK $\alpha$ )-, I $\kappa$ B kinase beta (IKK $\beta$ )-, constitutively active mutant of IKK $\beta$  (IKK $\beta$  SS/EE)-, or p65-induced



## Research Progress

NF- $\kappa$ B activation was inhibited by NS1 and NS1-70. Furthermore, NS1 and NS1-70 didn't interfere with TNF- $\alpha$ -mediated I $\kappa$ B $\alpha$  phosphorylation and degradation, nor p65 nuclear translocation. Coimmunoprecipitation assays confirmed the interaction of both NS1 and NS1-70 with p65. Of note, NS1 but not NS1-70 inhibited TNF- $\alpha$ -mediated

p65 phosphorylation at ser536. Our findings together indicate that HBoV NS1 and NS1-70 inhibit NF- $\kappa$ B activation. This is the first time that HBoV has been shown to inhibit NF- $\kappa$ B activation, revealing a potential immune-evasion mechanism that is likely important for HBoV pathogenesis.

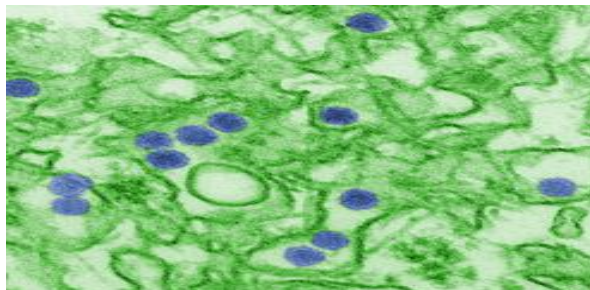
Link:<http://www.nature.com/articles/srep28481>

## Cooperation

### WIV Received Zika Virus Strains from France

**Z**ika virus is a mosquito-borne virus transmitted by *Aedes* mosquitoes. The same mosquito also transmits 3 other vector-borne diseases --- dengue, chikungunya and yellow fever – across tropical and subtropical regions around the world. From May 2015, the disease spreads from the Americas to the whole world, which has been a global public health emergency. From then on, as countries are actively building the coping mechanism towards Zika virus based on science and technology, the virus strain has become a significant strategic resource.

Recently, with the administrative approvals by the General Administration of Quality Supervision, Inspection and Quarantine of China and Hubei Entry-Exit Inspection and Quarantine Bureau, the Microorganisms and Viruses Culture Collection Center (VCCC), WIV, CAS has received successfully 2 Zika virus strains from “European Virus Archive goes global” (EVAg). Therefore, WIV has 3 Zika virus strains, which will provide a basis for the relevant research in China.



The EVAg project is aimed at the largest global virus collection network. Now it includes an international group of 23 laboratories including 16 EU member state institutions and 7 non-EU institutions. As a core member under EVAg project, WIV is also entitled as one of the distribution centers of EVAg Zika virus strains in China. With meeting the national conditions and qualities to transfer the virus strains, institutions or universities can apply to receive the virus strains from VCCC for scientific research. Furthermore, our center could assist if you need to receive the Zika virus from EVAg project. Please search for details on the following website: <http://www.european-virus-archive.com/faqs/how-receive-evag-zika-strains-china-laboratories>.

If you need other virus strains, please contact VCCC (<http://www.virus.org.cn>).



## Cooperation

## Professor Branka HORVAT in French National Institute of Health and Medical Research Visited WIV

On July 6th 2016, Prof. Branka HORVAT, the Research Director of International Center for Infectiology Research (CIRI) in French National Institute of Health and Medical Research (INSERM) visited WIV, and gave an academic talk on “Emerging contagion: Immunopathogenesis of Henipavirus infection and novel prophylactic approaches”, which was presided by Prof. Zhengli Shi, to the teachers and students in our institute.

In the report, Prof. HORVAT introduced that Nipah virus (NiV) and Hendra virus (HeV) are highly pathogenic neurotropic zoonotic paramyxoviruses of Henipavirus genus that cause human outbreaks in South-East Asia and Australia. Fruit bats are natural reservoir for both viruses, presenting only asymptomatic infection. Similarly to previous Ebola occurrences, Henipavirus outbreaks remain sporadic until now and seem to affect only small areas; however, they may have a global pandemic potential and present an agents of particular concern in the field of human and agricultural biodefense. Immunoneuropathogenesis of this recently emerged viruses is still poorly understood and licensed therapeutic and preventive options are still missing. Although lymphocytes are not susceptible to Henipavirus infection, they bind efficiently the virus via heparan-sulfate and transfect susceptible cells. The research group led by Prof. HORVAT has analyzed different type of mice, bearing defects in either innate or adaptive immune system,

for the susceptibility to NiV infection and development of fatal encephalitis. In contrast to wild-type, mice deficient for type-I interferon (IFN-I) receptor were highly susceptible to NiV. Although viral sensing through either TLR or RLR alone was not critical in anti-viral defense, mice devoid in both TLR and RLR signaling succumbed to the infection, with similar survival rate as IFN-I deficient mice. Furthermore, depletion of macrophages allowed rapid systemic propagation of NiV infection and high lethality in mice, suggesting their important role at the crossroads between innate and adaptive immunity. Finally, they have demonstrated the efficiency of Canarypox recombinant vector expressing HeV glycoproteins as a new vaccine candidate to confer protection against Hendra infection. Their results suggest that this novel ALVAC-based vaccine presents the potential for breaking the chain of HeV transmission from bats to horses and then to humans, thereby protecting both animal and human health, and integrating thus into One Health approach.



## Cooperation

# 2017 CAS-TWAS President's Fellowship Programme for Doctoral Candidates

**A**ccording to an agreement between CAS and The World Academy of Sciences (TWAS) for the advancement of science in developing countries, up to 200 students/scholars from all over the world will be sponsored to study in China for doctoral degrees for up to 4 years. Under this programme, students who are non-Chinese citizens have the opportunity to pursue doctoral degrees at the University of Chinese Academy of Sciences (UCAS), the University of Science and Technology of China (USTC) or Institutes of CAS around China. Here WIV is calling for application to study in our institute under the programme.

**Deadline for submitting applications:**  
31 MARCH 2017

**Where to enquire and submit application:**  
Ms. Pei Pingping  
The Graduate Office  
Wuhan Institute of Virology, Chinese  
Academy of Sciences  
Wuhan, China 430071  
Email: [yjs@wh.iov.cn](mailto:yjs@wh.iov.cn)



## Science Tips

# U.S. Reports First Female-to-Male Zika Transmission

**T**he U.S. Centers for Disease Control and Prevention (CDC) announced on Friday it has documented the first case of the mosquito-borne Zika virus being transmitted from one woman to her male partner during sex in New York City.



"The New York City report of female-to-male sexual transmission of Zika virus infection is the first documented case of sexual transmission of Zika from a woman to her sex partner and adds to the growing body of knowledge about the sexual transmission of Zika," the CDC said in a statement.

"All previously reported cases of sexually transmitted Zika virus infection have been spread from men to their sex partners," it said.

The woman, who was nonpregnant and in her twenties, had condomless sex with her



## Science Tips

male partner, also in his twenties, the day she returned to New York City from travel to an area with ongoing Zika virus transmission, the CDC reported in its Morbidity and Mortality Weekly Report.

She had headache and abdominal cramping while in the airport awaiting return to the U.S. and developed symptoms including fever, fatigue, a maculopapular rash and back pain the following day. Then, she visited her primary care provider who obtained blood and urine specimens, in which the Zika virus was detected. Days later, her male partner, who had not traveled outside the U.S. this year, developed fever, a maculopapular rash,

joint pain and conjunctivitis and blood and urine tests showed he had been infected with the Zika virus.

The CDC continued to recommend that all pregnant women who have a sex partner who has traveled to or resides in an area with Zika use barrier methods every time they have sex or they should not have sex during the pregnancy. "Although no cases of woman-to-woman Zika transmission have been reported, these recommendations now also apply to female sex partners of pregnant women," the U.S. agency added.

Source: Xinhua

Image: James Gathany/CDC

## Express News

## The Symposium on Microbiology and Human Health

On June 7th 2016, the Symposium on Microbiology and Human Health was held by WIV and Hubei Society for Microbiology. More than 100 experts from scientific institutions, universities and enterprises from home and abroad attended the symposium. On the opening ceremony, Professor Xinwen Chen, the Director General of WIV, delivered the

the opening address. 13 experts including Professor Hongbin Shu from Wuhan University, Professpr Xianen Zhang from Institute of Biophysics, CAS, Professor Hong Tang from Institut Pasteur of Shanghai, CAS and Professor Qi Jin from Institute of Medical Biology, Chinese Academy of Medical Sciences delivered speeches in the symposium.

## 微生物与健康学术研讨会

SYMPOSIUM ON MICROBIOLOGY AND HUMAN HEALTH

湖北 武汉 2016.6.6-6.7

