PRESIDENT'S SCIENCE AWARD 2021

Professor Wang Linfa
Professor, Programme in Emerging Infectious Diseases, Duke-NUS Medical School
Executive Director, Programme for Research in Epidemic Preparedness and Responses (PREPARE), Ministry of Health

"In recognition of his stellar contributions to the field of bat biology and emerging viral diseases, and the successful translation of his discoveries into biomedical innovations that have helped combat several viral outbreaks, including the COVID-19 pandemic"

Professor Wang Linfa is one of the world's foremost experts on emerging bat-borne viruses. Through his body of work, published over several decades, Prof Wang has established bats as a new model system for understanding zoonotic transmission of viral diseases. His breakthrough research and biomedical innovations have informed national responses to multiple major outbreaks and pandemics.

Bats, the only flying mammals, have a remarkable ability to host viruses without showing any clinical signs of infection. Over the last few decades, the viruses behind major outbreaks the world has seen, including Hendra, SARS, MERS, Marburg, Ebola, and the current COVID-19 pandemic, are suspected to have originated from bats. Understanding what makes bats an ideal reservoir for so many viruses is a major focus of Prof Wang's research.

Originally trained in biochemistry and molecular biology, Prof Wang built his expertise in bat biology and emerging viruses by forging an extensive network of collaborations with virologists, immunologists, bat biologists and infectious disease experts across the globe. His team's surveillance studies of wildlife, livestock and human hosts have been instrumental in identifying bats as major reservoirs of emerging zoonotic viruses.

Most notably, Prof Wang led the international team of experts which discovered that bats were the reservoir for SARS-CoV-1. More recently, he has shown that bats gained their uncanny ability to co-exist with viruses by adapting their host defense mechanisms over 65 million years of evolutionary history. This new understanding will help to better predict, prevent and control future viral spillovers, and may lead to novel approaches for improving human health.

Beyond infectious diseases, Prof Wang's bat biology research has implications for other diseases, including cancer, inflammatory diseases and ageing-related complications. Two patents and a novel class of anti-inflammatory drugs that is under development have emerged from his work that unraveled the unique inflammatory responses exhibited by bats.

From being the first in Singapore to culture SARS-CoV-2 from a patient's blood sample to being the first in the world to adopt retrospective serological testing for more effective contact tracing, Prof Wang's team has made significant contributions to Singapore's COVID-19 response. To advance serological testing, he developed a novel surrogate virus neutralisation test that detects SARS-CoV-2 neutralising antibodies with high specificity and sensitivity. Developed and commercialised in collaboration with DxD Hub and GenScript, the test was launched in Singapore in May 2020 under the trade name cPass™. cPass is currently the only FDA-approved test for detecting SARS-CoV-2 neutralising antibodies and is used in more than 50 countries, impacting vaccination strategies as well as deepening our understanding of long-

term immunity. It is further being deployed in an ASEAN-wide serological follow-up study of vaccine efficacy, of which Prof Wang is a lead principal investigator.

Prof Wang's most recent work focuses on designing a third-generation coronavirus vaccine (3GCoVax) that could combat not only known SARS-CoV-2 variants, but also other coronaviruses that may emerge in the future. Currently under development as a generic booster, 3GCoVax is based on Prof Wang's groundbreaking discovery that SARS-CoV-1 survivors who have been vaccinated against SARS-CoV-2 produce powerful neutralising antibodies.

As a member of multiple WHO COVID-19 committees, the Scientific Advisory Committee of the Coalition for Epidemic Preparedness Innovations (CEPI) and Singapore's COVID-19 Research Workgroup, Prof Wang has contributed to policies and roadmaps for identifying emerging zoonotic diseases and preparing national and international agencies to better respond to epidemics and pandemics. He is currently Professor of Emerging Infectious Diseases at Duke-NUS Medical School and was recently appointed Executive Director of the recently established National Programme for Research in Epidemic Preparedness and Responses (PREPARE).. He has nurtured several young scientists into independent principal investigators and, since joining Duke-NUS eight years ago, trained five MD-PhD students.

Having published over 450 papers, including many in top journals like *Science*, *Nature*, and *Lancet*, Prof Wang's work earned him more than 36,000 citations and a H-index of 97 (Web of Science 2021). He was also elected to prestigious academic bodies, including the Australian Academy of Technological Sciences and Engineering (2010) and the American Academy of Microbiology (2021) in recognition of his exemplary contributions to the field.