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LEAD ARTICLE

UDG faculty members and students showing their solidarity with China and Wuhan, one of the hardest-hit cities in the country. [IMAGE: ALLIANCE OF INTERNATIONAL SCIENCE ORGANIZATIONS]

ANSO members and global partners of CAS cheer for China

The Secretariat of the Alliance of International Science Organization (ANSO) has been receiving encouragement and best wishes from its members and global partners of the Chinese Academy of Sciences (CAS), since the outbreak of the COVID-19, according to the academy.

They have demonstrated their sympathy with Chinese people affected by the epidemic and expressed their resolve and willingness to cooperate internationally to defeat the virus.

The alliance has heard from the Russian Academy of Sciences, the Pakistan Academy of Sciences, the Pakistan National Council for Tibb, the National Science and Technology Development Agency, Thailand, the Mongolian Academy of Sciences, the University of Donja Gorica (UDG), Montenegro, the University of Ruhuna, Sri Lanka, Nepal's Tribhuvan University, the International Center for Integrated Mountain Development, and the African Academy of Sciences.

These academies, universities and organizations spoke highly of the effective measures taken by the Chinese government in the fight against COVID-19, expressed their consolations to the Chinese people, and showed faith in China's victory against the virus.

Founded by CAS in Beijing in November 2018, the alliance has 52 members. The research institutes of ANSO members are looking forward to cooperating with Chinese medical staff and researchers to develop effective "weapons" against COVID-19 with the help of traditional medicine and practice.

Source: CRI Online

HOT ISSUE

'ALivE' planning tool's user manual available in Chinese and Russian

The ecosystem-based adaptation planning tool "ALivE–Adaptation, Livelihoods and Ecosystems" user manual was officially released in both Chinese and Russian language versions. >> **PAGE 2**

RESEARCH PROGRESS

Progress made in high-efficiency organic solar cells

A research group led by Professor Ge Ziyi at NIMTE of CAS has made great progress in organic solar cells (OSCs) research. >> **PAGE 3**

INTERNATIONAL COOPERATION

Foreign institutes write to support CAS's anti-virus fight

More than 80 partners and universities in the US, Britain, Australia, Japan, Russia and Thailand have written to express their sincere consolations and firm support to CAS since the outbreak of the COVID-19. >> **PAGE 5**

SCIENCE STORY

Life in China

The incredible resources provided by the Chinese Academy of Sciences and the amazing fossils unearthed in China provided Jingmai Kathleen O'Connor with the tools needed to succeed in a field that is highly competitive. >> **PAGE 6**

NEWS IN BRIEF

NAO receives encouragement globally

China's national team of astronomical researchers, the National Astronomical Observatories of CAS, received consolation and encouragement from its global partners and fellows. >> **PAGE 7**

Edited by Bureau of International Co-operation, Chinese Academy of Sciences
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‘ALivE’ planning tool’s user manual available in Chinese and Russian

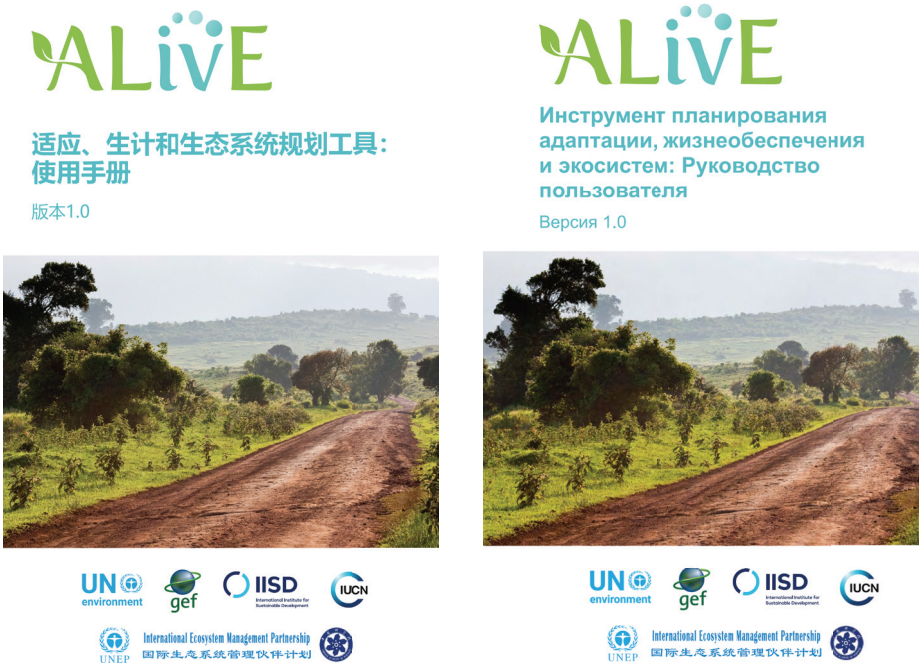
The ecosystem-based adaptation planning tool “ALivE–Adaptation, Livelihoods and Ecosystems” user manual was officially released recently in both Chinese and Russian language versions, with financial support from the Alliance of International Science Organizations in the Belt and Road Region (ANSO).

Launched in July 2018, ALivE is a computer-based tool to support ecosystem-based approaches to climate change adaptation. It also helps ecosystem-based adaptation (EbA) project managers and practitioners to organize and analyse information, when they are planning EbA options within a broader EbA planning process.

Accompanying the tool, the ALivE user manual provides users with detailed guidance on applying ALivE as part of the EbA planning process. In addition to step-by-step instructions for using the tool itself, the manual provides a framework and methodologies for collecting and organising the information required to use ALivE, as well as guidance on identifying entry points for integrating EbA into policies and planning processes.

The user manual had been produced in English, French, Nepalese and Spanish languages. The tool has also been widely promoted within the EbA South pilot countries (Mauritania, Nepal and Seychelles) and beyond, resulting in its real application in many EbA initiatives in various countries, including those in South America and Southeast Asia.

ALivE is one of the most relevant and up-to-date tools for the planning of ‘natural-based’ solutions as described by the UN Climate Summit. It is a rapid qualitative assessment technique that can be applied in any ecosystem type.



“ALivE” Planning Tool’s User Manual [IMAGE: UNEP-IEMP]

ALivE is a key “Ecosystem-Based Adaptation through South-South Cooperation (EbA South) Project” deliverable, developed in partnership with the International Institute for Sustainable Development (IISD) and the International Union for Conservation of Nature (IUCN).

As part of the EbA South Project Steering Committee, the Chinese Academy of Sciences (CAS) offered financial support to further translate the ALivE user manual into the Chinese and Russian languages in May 2019, aiming to encourage more extensive application of the tool in Chinese-speaking and Russian-speaking countries.

The funding support came from the Alliance of International Science Organizations in the Belt and Road Region (ANSO) — a non-profit, non-governmental and international scientific organisation jointly initiated by CAS.

The ALivE EbA planning tool and its user manual are now available for downloading from the IISD website and the EbA South website.

Since 2013, EbA South has been delivered by the National Development and Reform Commission of China, through the Institute of Geographic Sciences and Natural Resources Research of CAS. It is funded by the Global Environment Facility (GEF) and implemented by the United Nations Environment Program (UNEP). The project’s overall goal is to assist vulnerable communities in Africa and Asia-Pacific to adapt to the impacts of climate change, by improving their capacity to plan, implement, finance, research and legislate in support of EbA.

Source: Chinese Academy of Sciences

Progress made in high-efficiency organic solar cells

A research group led by Professor Ge Ziyi at the Ningbo Institute of Materials Technology and Engineering (NIMTE) of the Chinese Academy of Sciences (CAS) has made great progress in organic solar cells (OSCs) research.

By virtue of simple alkyl chain modification of the non-fullerene acceptors (NFAs) (*Advanced Materials,* 2019, 31, 1903441) as well as a ternary heterojunction strategy of introducing PC71BM into the PM6:Y6 binary system (*Advanced Materials,* 2019, 31, 1902210), researchers have improved the power conversion efficiency (PCE) and processing ability of OSCs, promising OSCs a bright future for practical application and large-scale fabrication.

Solar energy, as an inexhaustible energy bestowed by nature, has drawn great attention in recent years due to huge demand for energy resources and increasingly serious environmental pollution. OSCs have shown great application prospects in portable, flexible cells and photovoltaic energy supply, owing to their unique advantages of low cost, lightweight, flexibility, and mass fabrication.

Through cooperation with Professor Hou Jianhui at the Institute of Chemistry, CAS, a novel NFA of BTP-4F-12 (Fig.1) was successfully synthesized by increasing the length of a flexible alkyl side chain on the benzothiadiazole unit, as well as regulating molecular arrangement and solubility. Combining with the polymer donor of T1, the NFA BTP-4F-12 showed a high PCE of 16.4 percent.

In addition, the research group employed a ternary strategy by introducing the third component PC71BM into the PM6:Y6 binary systems to tune the light absorption and morphologies of the blend films, achieving a record PCE of 16.67 percent (certified as 16.0 percent) on rigid OSCs (Fig. 2). In addition, a PCE of 14.06 percent for flexible ITO-free OSCs was obtained, which was the highest PCE reported for flexible OSCs. Most importantly, the PCE of the flexible devices still remained at over 90 percent of the initial PCE, after 1,000 bending cycles (r = 5.0 mm), indicating the merits of high efficiency and excellent bending performance.

These studies have made breakthroughs in OSC power conversion efficiency and processing ability, and shed light on potential large-scale commercial fabrication and application of OSCs.

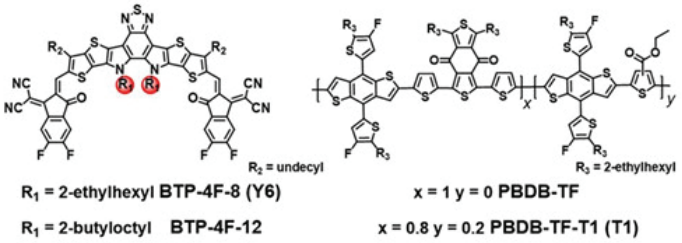


Fig. 1 Molecular structures of BTP-4F-12 and T1 [IMAGE: NIMTE]

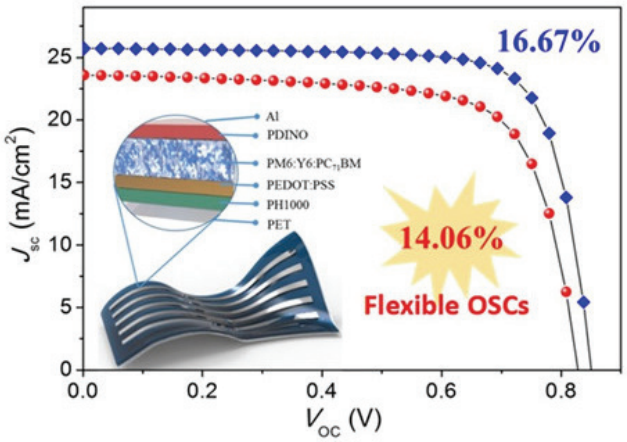


Fig. 2 The schematic structure and J–V curves of the flexible device [IMAGE: NIMTE]

The research was financially supported by the National Key R&D Program of China (No. 2017YFE0106000), the National Natural Science Foundation of China (No. 51773212, No. 21574144, No. 61705240, and No. 21674123), the Zhejiang Provincial Natural Science Foundation of China (No. LR16B040002), the Ningbo Municipal Science and Technology Innovative Research Team (No. 2015B11002 and No. 2016B10005), and the CAS Key Projects of Frontier Science Research (No. QYZDB-SSW-SYS030) and International Cooperation (No. 174433KYSB20160065).

For more information, please contact
Peng Ruixiang
Ningbo Institute of Materials Technology and Engineering, Chinese Academy of Sciences
E-mail: pengrx@nimte.ac.cn

Source: Ningbo Institute of Materials Technology and Engineering, Chinese Academy of Sciences

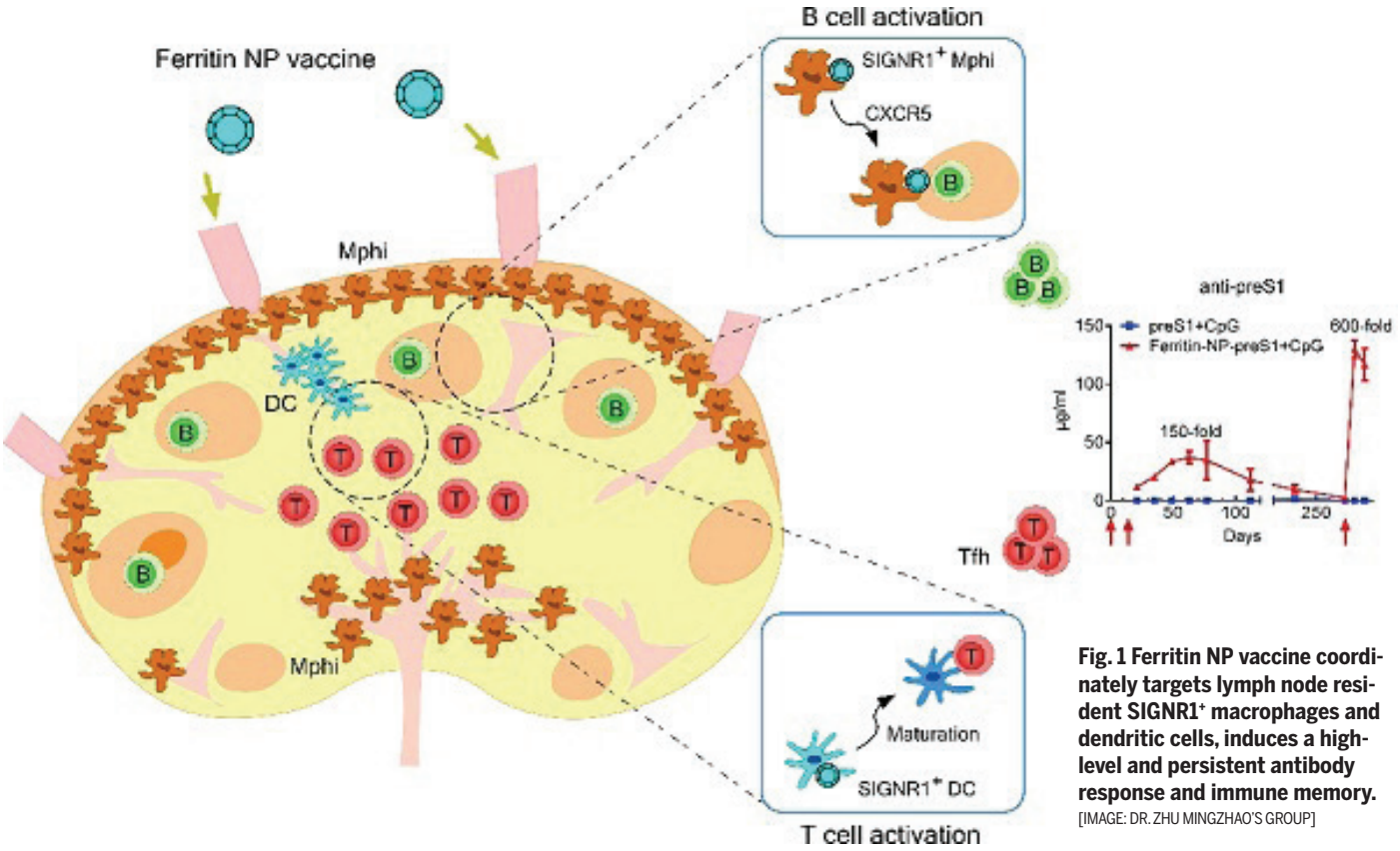


Fig. 1 Ferritin NP vaccine coordinately targets lymph node resident SIGNR1⁺ macrophages and dendritic cells, induces a high-level and persistent antibody response and immune memory.
[IMAGE: DR. ZHU MINGZHAO'S GROUP]

New strategy for therapy of chronic hepatitis B

Hepatitis B is a major global health issue caused by the hepatitis B virus (HBV), which attacks the liver and can cause both acute and chronic diseases. It is estimated that 257 million people worldwide are chronic HBV carriers and have a high risk of developing liver disease, cirrhosis and hepatocellular carcinoma (HCC). Approximately one million patients die from these late complications each year. Although conventional HBsAg vaccination has gained great success in prevention of hepatitis B virus infection, a therapeutic vaccine is still lacking. HBV preS1 has been suggested as a unique target for therapeutic vaccine development. However, due to the poor immunogenicity of preS1, a clinically translatable vaccine design that could induce efficient therapeutic antibody response is not available.

Given the crucial role of lymph node (LN) antigen presenting cells (APCs) in the induction of adaptive immune responses, it is not surprising they are quite often targeted for vaccine design. In fact, LN APC-targeting has been frequently considered to be a valuable feature for many nanomaterial-based vaccines. However, given the complex composition of APCs and the diversified functions of different APC subsets, the specific roles of different APC subsets during nanoparticle vaccine immunization appears to be only minimally and vaguely understood. Moreover, it is less clear how to target them in a coordinated manner for an efficient adaptive immune response.

In the current study, the scientists found that ferritin nanoparticle (NP) based vaccine can coordinately target SIGNR1⁺ resident dendritic cells and lymphatic sinus macrophages in the LNs for effective Tfh response and B cell activation and antibody production, leading to an impressive therapeutic effect against chronic HBV infection.

In naive mice, this ferritin-preS1 NP vaccine induced a robust response that was 150-fold higher and more persistent (235 days) anti-preS1 than the control preS1 vaccine, with a superb memory response upon a boost immunization at day 270. The vaccination led to a significant reduction of HBV load in the peripheral blood upon AAV-HBV1.3 infection. Furthermore, in AAV-HBV1.3 carrier mice, ferritin-preS1 NP vaccine induced a high anti-preS1 response similar to that in naive

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Foreign institutes write to support CAS's anti-virus fight

More than 108 partners and universities in 40 countries including the US, the UK, Australia, Japan, Russia and Thailand have written to express their sincere sympathies and firm support to the Chinese Academy of Sciences (CAS) since the outbreak of COVID-19.

They appreciated the efforts and contributions of China, and in particular of CAS scientists, in the fight against the virus.

The letters demonstrate the profound cooperation between CAS and these organizations as well as the importance of international exchange and cooperation in addressing the common challenges of mankind.

President of German National Academy of Sciences Leopoldina said in his letter that he highly appreciated the leadership, execution, transparency and outstanding contributions of the Chinese government in the fight against the COVID-19 , adding that the scientific communities of the two countries had never been so closely united in the fight against the spread of the epidemic as they are now.

President of German National Academy of Sciences Leopoldina also spoke highly of the fruitful results of the video-conference on COVID-19 held by the academy and the Chinese Embassy in Germany, and expressed his hopes of continuing discussions with CAS scientists on related issues.

The President of the University of Tokyo said in his letter that he admires the dedication of the Chinese people in fighting the epidemic and that their efforts are widely reported in Japan.

The current dilemma has strengthened the friendship between the people of China and Montenegro and between the academy and the University of Donja Gorica (UDG), according to its president.

All these institutions agreed to establish a closer cooperative relationship with CAS, and proposed ways to continue bilateral exchanges and cooperation during the epidemic period, offering valuable suggestions and practical assistance in the joint response to the outbreak.

The Commonwealth Scientific and Industrial Research Organization in Australia wrote to say that they are always striving to formulate new protocols to maintain cooperation with CAS as well as scheduled research programs.

It also suggested temporary video conferences and looked forward to seeking collaboration with CAS in vaccine development.

CAS replied to these letters to thank the writers for their support, saying that CAS is willing to share China's practice with international fellows while combating the virus domestically. CAS also sent letters to research institutions in Japan, South Korea, Iran and Italy expressing its willingness to promote scientific and technological cooperation and to share breakthroughs in COVID-19 prevention and control.

Source: Bureau of International Cooperation, Chinese Academy of Sciences

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mice and significantly reduced HBV load in both peripheral blood (HBsAg, HBV DNA) and livers (HBcAg and cccDNA). Moreover, in four out of seven mice in the ferritin NP-preS1 group, sera HBV DNA dropped to undetectable levels. Those mice also showed barely detectable HBsAg and significant amount of anti-HBs, an indicator for functional cure.

Mechanistically, the ferritin NP was first revealed to be able to target distinct SIGNR1$^+$ myeloid cells for antibody response. While resident SIGNR1$^+$ dendritic cells captured and processed NP antigens for Tfh induction, lymphatic sinus associated SIGNR1$^+$ macrophages served as an NP antigen depot and migrated and transferred antigens to follicular regions for B cell activation in a CXCR5-dependent manner, suggesting a novel mode of NP antigen transfer via CXCR5-dependent macrophage migration.

This study uncovers a previously unrecognized mechanism of the coordination of lymph node resident cells for antibody response engaged by ferritin NP vaccine and offers a promising translatable vaccination strategy for the functional cure of chronic hepatitis B. The above research result was published by the research group led by Doctor Zhu Mingzhao from the Institute of Biophysics, Chinese Academy of Sciences in *Nature Nanotechnology* on March 2, 2020.

For more information, please contact:
Dr. Zhu Mingzhao
Institute of Biophysics, Chinese Academy of Sciences
E-mail: zhumz@ibp.ac.cn

Source: Dr. Zhu Mingzhao's Group of Key Laboratory of Infection and Immunity Development, Institute of Biophysics, Chinese Academy of Sciences

Jingmai Kathleen O'Connor [IMAGE: JINGMAI KATHLEEN O'CONNOR, INSTITUTE OF VERTEBRATE PALEONTOLOGY AND PALEOANTHROPOLOGY, CHINESE ACADEMY OF SCIENCES]

This fall marks 11 years that I have been living in China and working at the Institute of Vertebrate Paleontology and Paleoanthropology of the Chinese Academy of Sciences (CAS). I discovered Paleontology in 2002 as a freshman in college. At the same time, I learned about the amazing fossils coming out of northern China like the feathered dinosaurs that once and for all linked birds and dinosaurs (the idea that birds are living dinosaurs was debated until undeniable evidence was unearthed in China in the late 1990s). I have always loved China, being half Chinese and growing up fascinated with the culture of my mother and grandparents. I decided to pursue paleontology and specifically my goal was to study Chinese fossils, so I could combine these two interests.

In 2009, after graduating with my PhD, I moved to Beijing. Originally, a postdoc in China with the support of a CAS grant for young foreign scientists (former PIFI project), and then several more in different parts of the world to satiate my wanderlust, but in the end I never left Beijing and 11 years later I'm still here and still loving it. The incredible resources provided by the Chinese Academy of Sciences and the amazing fossils unearthed in China provided me with the tools needed to succeed in a field that is highly competitive — last fall I was awarded the Paleontological Society's Schuchert Award for outstanding scientists under 40. I know that my success is in a very large part due to the fact that I moved to China (working hard is also a requirement — but this is much easier to do if you have a supportive work environment), and I am incredibly grateful for the opportunities afforded me here — and I am eager to share my story with other intrepid young scientists who are willing to leave their comfort zone and take advantage of the many things this nation has to offer.

I am a vertebrate paleontologist studying the dinosaurian origin of birds. Originally from America, as I mentioned, I am also half Chinese. I was always fascinated by what my mother taught me about Chinese culture — particularly about the respect for scholars, something very different from the more capitalist ideals of the West. My mother is a geologist and I followed her into academia. However, my mother didn't stay long in academia — unfortunately it is a very difficult and unrewarding environment in America. In contrast, as a scientist you could not dream of a better place to work than as part of the Chinese Academy of Sciences (I'm not exaggerating). Few people outside China know the beauty of conducting scientific research nearly completely unfettered. Back home science is constantly under attack by general society and research is underfunded, whereas in China if you work hard there is no resource that is unavailable to you. If your research is productive, there is no equipment that you cannot justify to purchase or research trip that you cannot go on. In my institute I am part of a lab working on the same research topic but from different angles, providing an amazing collaborative environment that doesn't exist in most foreign institutions that can only hire one person per research topic (or sometimes even only one per field). In the work environment I have not experienced any of the prejudice that also unfortunately plagues society where I am from. I have always found colleagues to be friendly and super helpful when it comes to navigating life in China and institutional bureaucracy (which exists everywhere). More recently, as CAS has moved ever increasingly into the spotlight of the scientific community, our institution is becoming more and more international as it attracts foreign scholars at every level, from student, to postdoc, to professor, reflecting the acknowledged importance of international collaboration.

Of course, life is not all work — what about living in China? I will admit, when I first moved to Beijing I experienced a bit of culture shock — I've never lived in such an intense city with so much going on. But once I got used to it, I loved it — and I can't imagine living anywhere else. I love the long and colorful history that is reflected in the hutong area and temples, the incredibly colorful culture reflected in the flavorful food and colorful way people dress, and the friendly smiles you will get from most people in your neighborhood. I lived in the hutong area (the ancient part of Beijing city) for eight years, an experience I would recommend to anyone who comes to live and work in Beijing. In addition to the rich cultural surroundings, in many ways life in Beijing is more convenient than life where I grew up. The public transportation system is second best in the world (Shanghai being the best) and technology has made it possible to get anything you want with just a smart phone in hand. There are concerts by local and foreign artists, music festivals, several amazing art districts, free lectures on numerous topics, and many clubs and organizations focused on sports or different interests so that it is impossible to be bored or lonely. Life is not perfect anywhere, but with a positive attitude and hard work, anyone can have a fulfilling life and successful scientific career in the myriad of institutions, universities, and companies providing all sorts of career opportunities throughout China.

Source: Jingmai Kathleen O'Connor, Institute of Vertebrate Paleontology and Paleoanthropology, Chinese Academy of Sciences

NAO receives encouragement globally

In early February, the COVID-19 began to spread across the nation. The concerted efforts made by the Chinese people in the fight against the virus have gained wide support from the international community.

China's national team of astronomical researchers, the National Astronomical Observatories of the Chinese Academy of Sciences, also received consolation and encouragement from its global partners and fellows.

Source: National Astronomical Observatories, Chinese Academy of Sciences

Staff at the Copernicus Institute in Poland show their support for China's anti-virus battle with messages of encouragement in different languages.
[IMAGE: NATIONAL ASTRONOMICAL OBSERVATORIES, CHINESE ACADEMY OF SCIENCE]

CAS contributes to China's top 10 scientific advances

Seven scientific research projects carried out either jointly or independently by the Chinese Academy of Sciences (CAS) were named among China's top 10 scientific advances on February 27.

The evidence of mantle material on the far side of the moon, a study conducted by a research team led by Li Chunlai at the National Astronomical Observatories of CAS, and the deciphering of the protein structures and functions of algae's underwater photosynthesis, a research project led by Shen Jianren and Kuang Tingyun from CAS Institute of Botany, are both on the list.

Liu Yanhui's research group from the Institute of Physics of CAS and their collaborators developed a high-throughput experimental method based on the concept of material genetic engineering with high efficiency, non-destructiveness, and easy promotion.

Chen Fahu's research group from the Qinghai-Tibet Plateau Research Institute of CAS, Zhang Dongju's research group from Lanzhou University, and the Jean-Jacques Hublin research group from the Institute of Evolutionary Anthropology of the Max Planck Society of Germany, and other collaborators, have reported the identification of a Denisova.

The University of Science and Technology of China's (USTC) Pan Jianwei and colleagues Peng Chengzhi, Fan Jingyun and their collaborators — using the "Muzi" quantum scientific experimental satellite — are the first in the world to conduct an experimental test of gravity-induced quantum entanglement decoherence in space.

The team of Rao Zihe and Wang Xiangxi from the Institute of Biophysics of CAS and the Bu Zhigao team from the Harbin Veterinary Research Institute of the Chinese Academy of Agricultural Sciences, together with the Shanghai University of Science and Technology, have unveiled the structure of the capsid of the African swine fever virus.

Zhang Liyuan's research group from the Department of Physics at the Southern University of Science and Technology, Qiao Zhenhua's research group from the Department of Physics of USTC, and Yang Shengyuan of Singapore University of Science and Technology have collaborated to realize the "three-dimensional quantum Hall effect".

The selection has three rounds. Five leading Chinese science and academic journals first recommended 320 sets of research whose results were officially published between December 1, 2018 and November 30, 2019.

The ministry then invited experts from the fields of mathematics and astronomy, chemistry and materials sciences, earth and environmental sciences, and life and medical sciences, to shortlist 30 candidates for the final selection.

Finally, more than 2,600 scientists from CAS, Chinese Academy of Engineering and other academic departments voted online for the top 10.

Initiated by the basic research management center of the Ministry of Science and Technology, the selection has been held for 15 years and aims to publicize China's major achievements in fundamental research, encourage the country's researchers to popularize their work, and raise public awareness in support of scientific research.

Source: Chinese Academy of Sciences