Volume.825, Issue No.2 2021
2021 第 2 期，总第 825 期

中国科技通讯

CHINA SCIENCE & TECHNOLOGY NEWSLETTER

Review of China's Science and Technology Highlights in 2020

Science and Technology Boosts Efforts in Poverty Alleviation

Top Scientists —— Song Zhenqi and Wu Mengchao

Review of China's Science and Technology Highlights in 2020

◆ China ranks 14th in 2020 Global Innovation Index

According to the Report of Global Innovation Index (GII) 2020 released by the World Intellectual Property Organization (WIPO) on September 2nd, China ranks 14th among 131 economies on the list. China has been among the top 15 in the world for two consecutive years. As the only middle-income economy among the top 30 in GII comprehensive ranking, China has demonstrated leading advantages in many aspects.

◆ China becomes the largest source of international patent applications for the first time

On April 7, WIPO published the number of international patent applications in 2019, which showed that China filed 58,990 applications through the Patent Cooperation Treaty (PCT) system in 2019, making it the largest source of international patent applications for the first time. This reflects China's notable progress in innovation capability and public awareness of the importance of intellectual property rights.

◆ World's first Human Cell Atlas (HCA) published

The Zhejiang University School of Medicine mapped the first HCA by using a self-developed analysis platform. Published in Nature online on March 26th, the study showcased for the first time a comprehensive analysis of the types of human cells during embryonic and adult time periods at single cell level. The research data will become a treasure house for exploring the mechanism of cell fate determination.

◆ Existence of two-dimensional hexagonal ice first confirmed

For a long time, there is lack of exact experimental evidence to prove the existence of stable two-dimensional hexagonal ice in nature. Research teams from Peking University, University of Nebraska–Lincoln (UNL) and the Chinese Academy of Sciences confirmed for the first time the existence of two-dimensional hexagonal ice by experiments, and photo- graphed the formation process of two-dimensional hexagonal ice by atomic resolution, revealing its special growth mechanism. This achievement was published in Nature on January 1st.

◆ 600km/h maglev prototype completes successful trial run

On June 21st, the 600km/h high-speed maglev prototype successfully conducted its maiden test run, marking a breakthrough from static to dynamic operation. The test run obtained a large amount of crucial data and proved the key performance of the high-speed maglev system and core components, providing technical support for the development and optimization of the follow-up high-speed maglev project test vehicle.

◆ Kylin operating system unveiled

China Electronics Corporation (CEC) unveiled its new operating system Kylin V10 on August 13. It is a new-generation operating system developed independently by CEC. With its top-ranking security level in China, Kylin V10 is a witness to the leapfrog development of the country's homegrown operating system.

◆ AG600 successfully completes its maiden flight at sea

On July 26th, the domestic large amphibious aircraft AG600 "Kunlong" successfully completed its maiden flight at sea in Shandong Province, another milestone after the first flight of AG600 aircraft on land in 2017 and on water in 2018.

◆ China’s deep-sea manned submersible ”Fendouzhe” dives 10,909 meters in Mariana Trench

China's deep-sea manned submersible Fendouzhe, or "striver", successfully descended 10,909 meters in the Mariana Trench on November 10. Mariana Trench is called "the fourth pole of the Earth". With high water pressure, complete darkness and low temperature, it is one of the areas with the most hostile environment on Earth. Its deepest part is nearly 11,000 meters.

◆ World's first high-speed rail suspension bridge open to traffic

On December 11, Wufengshan Yangtze River Bridge, the world's first high-speed rail suspension bridge, was open to traffic. Being the first suspension bridge for road and rail in China, it’s also designed with the highest operation speed and the largest load in the world.

◆ BDS-3 Constellation Deployment fully completed

On June 23, the 55th BeiDou Navigation Satellite System (BDS), the last BDS-3 constellation satellite, was successfully launched at the Xichang Satellite Launch Center, marking the full completion of BDS-3 constellation deployment. BDS will continue to take an active part in international satellite navigation affairs, push forward the multisystem compatibility and sharing, boost international exchanges and cooperation, promote international BDS applications in response to the needs of the people around the world, and share the latest BDS development achievements.

◆ Tianwen 1 sends back picture of the Earth and Moon

On July 23rd, the Long March 5 Yao-4 carrier rocket blasted off with China's first Mars probe Tianwen 1. On July 27th, Tianwen 1 captured an image of the Earth and Moon using optical navigation sensors, about 1.2 million km away from the Earth, and sent the picture back to the Earth.

◆ Chang'e-5 successfully launched

On November 24, China successfully launched the Chang'e-5 lunar probe carried by the Long March-5 Y5 launch vehicle, marking China's first return mission with samples from an extraterrestrial celestial body. On December 17, the Chang'e-5 returner landed successfully. In this mission, the Chang'e-5 probe achieved several breakthroughs successively in the history of Chinese aerospace for the first time, including sampling and take-off on the lunar surface, lunar orbit rendezvous and sample return, drawing a successful conclusion to China's lunar exploration program.

◆ China's new medium-lift carrier rocket Long March-8 makes its maiden flight

On December 22, the homegrown Long March-8, a new medium-lift carrier rocket, successfully completed its maiden flight. This mission also helped to test related technologies such as rocket recycling and intelligent application.

Science and Technology Boosts Efforts in Poverty Alleviation

On December 23, 2020, the Information Office of the State Council of China held a press conference on China's efforts to fight against poverty through science and technology. Since 2012, at the S&T front, China has built 1,290 innovation and entrepreneurship platforms in poverty-stricken areas, paired up with 77,000 counties, dispatched 289,800 technical task force (TTF) members, invested more than 20 billion yuan, launched 37,600 technology projects at all levels, and spread more than 50,000 advanced and applicable technologies and new crop varieties. The series of measures has provided strong support for poverty-stricken areas to shift growth drivers, improve production capability and improve people's lives.

✧ Typical cases

TTF members dispatched to facilitate poverty relief efforts

The TTF members, selected by the Ministry of Science and Technology of the People's Republic of China, have injected strong impetus into the high-quality development of poverty-stricken areas. In Jinggangshan alone, five TTF teams, composed of 31 experts, have been sent to their paired-up areas to provide scientific and technological services and facilitate the establishment of start-ups. In 2017, Jinggangshan was the first to be removed from poverty list in China. The annual per-capita net income of local poor households increased to 10,205 yuan. TTF members have played a very important role in this process.

Academician workstation established at community level

Entrenched in poverty, Yunnan Province is one of the focuses of the relief efforts. Zhu Youyong, academician of Chinese Academy of Engineering and honorary president of Yunnan Agricultural University, stayed in Haozhiba, a poor village in Yunnan Province, for long-term efforts in poverty alleviation. He is the first TTF member to set up an

academician workstation at the community level. He spread the technology of intercropping of Chinese herbs and trees, developed through more than ten years of efforts, in poor mountainous areas. Thanks to the technology, the output per *mu* forest has reached RMB60,000-80,000 yuan, and local farmers have got out of poverty as a result.

System improved and more incentive policies introduced

At the beginning of 2020, the Ministry of Science and Technology issued *the Guidelines on Organizing and Mobilizing TTF Members to Spread Achievements, Enhance Services and Guarantee Spring Ploughing*. The document emphasizes the need to strengthen science and technology services in light of the characteristics and technical difficulties of spring ploughing in the context of COVID-19, and requires TTF members to provide technical services to improve resilience against disaster and raise the grain production capability. The document also highlights the need to compile and provide manuals of selected advanced and applicable technologies to farmers, and give online guidance to returned migrant workers on how to start a business.

Pairing-up poverty relief efforts by Zhongguancun Science Park's high-tech enterprises

As of October 2020, 844 high-tech enterprises from Zhongguancun Science Park had set up 1,391 branches in Beijing's paired-up areas, with an investment of 85.12 billion yuan. Those efforts paid off in agriculture, medical care, education and other areas closely related to public wellbeing. Poverty alleviation requires a change of attitude and the support of education, which is considered as a top priority in relief efforts. High-tech enterprises from Zhongguancun Science Park combine the two, giving a strong boost to poverty alleviation. New Oriental Education & Technology Group Inc takes the lead in applying 5G technology to rural education, sharing quality education resources through "online classrooms".

Top Scientists —— Song Zhenqi and Wu Mengchao

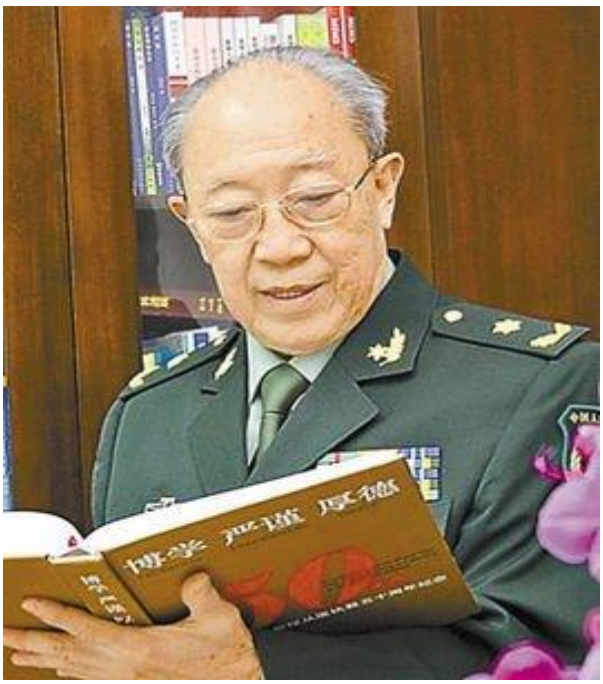
Song Zhenqi (1935-), an academician at the Chinese Academy of Sciences, is a scientist of mining pressure and rock strata control. He established and upgraded the strata movement centered mining pressure theory and research method system, and set up the first mining pressure research institute of Chinese universities. He developed the *Method for Dynamic Observation and Research of Underground Mine Rock Strata*, created monitoring devices such as dynamic roof monitoring instrument, and developed the computer system and software such as roof prediction and roof control design, which realized the integration of theory and method.

After graduation, Song Zhenqi worked as a faculty member at his alma mater. Not content to be a mere theorist, he led his students along to work in the mines and, by engaging in practice, solved production-restraining bottlenecks one after another.

In the decades that followed, he reached out to many mining areas such as Fengfeng, Pingdingshan, Huainan and Kailuan to explore the mystery of mining pressure. Song Zhenqi said that the production line is his biggest laboratory, which is a treasure place for research.

Through the long-term practice in coal mine production and the analysis of a large number of mine accidents, Song Zhenqi proposed his practical mining pressure control theory centering on the study of rock strata movement, which is recognized as an advanced scientific theory system.

Now in retirement, Song Zhenqi still plays his role by setting up an academician workstation and entrepreneurial park, contributing his insights. He is also dedicated to training young people. With his savings, he offers scholarships to financially distressed yet outstanding college students so that they can complete their studies and go on to contribute to China’s development.



Wu Mengchao (1922-) is an academician at the Chinese Academy of Sciences and winner of China's top science and technology award 2005.

As the main founder of Chinese hepatobiliary surgery, he established the theory, technical system and discipline system of Chinese hepatobiliary surgery. He is the winner of 35 first or second prizes at different levels for making scientific and technological progress. He won a first-class military merit in 1964, and was recognized as role model by the Central Military Commission for his medical contribution in 1996.

In 2011, a ceremony was held to announce the naming of Asteroid Wu Mengchao. Among all winners of China's top science and technology, Wu Mengchao is the very first to receive such an honor in the health sector of China. At the ceremony, he said that "I can look up at the starry sky with a clear conscience only when I devote myself to the frontiers of science, carry forward the scientific spirit and engage myself in innovation".

On January 14, 2019, Professor Wu Mengchao retired at the age of 98. Just one week before, he was still working in the operation theater. On the morning of his 90th birthday on August 31, 2011, Wu Mengchao still managed to perform two surgeries. In his 68-year career as a doctor, he performed a total of 14,280 surgeries.

(Source: Ministry of Science and Technology of China)