

Embedding Ethics into Sci-tech R&D

By LI Linxu

Given that sci-tech permeates into more and more of our daily lives, ethics governance in scientific research and technological development has become increasingly important.

As Albert Einstein said, "Science is a powerful instrument. How it is used, whether it is a blessing or a curse to mankind, depends on mankind and not on the instrument."

China has always attached great importance to ethics governance in sci-tech, and is committed to developing sci-tech for the greater good.

To strengthen the governance over ethics in sci-tech, a new guideline has recently been released by Chinese authorities.

It is the country's first comprehensive guideline on ethics governance in sci-tech, said Xiang Libin, vice-minister of science and technology, adding that it has filled in the gaps and will improve the public's ethics awareness.

The guideline is framed by five ethics principles, such as serving the well-being of humanity, respecting people's right to life, adhering to fairness and justice, controlling risks in an appropriate way, and maintaining openness and transparency.

Ethics compliance should be emphasized throughout the process of scientific research and technological development, stressed the guideline. Meanwhile, ethics governance should be based on laws and regulations, and should suit the conditions of the country.

No agency, organization or individual should conduct scientific activities that damage social, public, biological and ecological security, nor should they undermine the safety and well-being of people's lives, health and dignity.

With regard to international collaborative research projects, they should comply with regulation requirements of



China is leading the way on ethics governance in key areas such as the life sciences, medicine and artificial intelligence. Photo shows the 2021 World Artificial Intelligence Conference held in Shanghai. (PHOTO: VCG)

all concerned countries, and pass their own ethics reviews respectively.

For those with high ethical risks, the ethics review results should be double-checked by relevant Chinese authorities, according to the guideline.

Opening-up and international cooperation is also highlighted in the guideline.

Ethics governance in sci-tech has international dimensions, hence the global research community must abide by some basic norms, said Xiang, adding that the country is very open and proac-

tive in international cooperation on ethics governance.

China has actively taken part in drafting the *Ethics and Governance of Artificial Intelligence for Health: WHO Guidance* and played an important role in drafting the *UNESCO Recommendation on the Ethics of Artificial Intelligence*.

In view of the country's rapid development in sci-tech, with some frontier research entering uncharted territories, international cooperation is more needed now than ever, said Xiang.

Endangered Yangtze Species Smiling after Green Measure Success

By ZHONG Jianli and JIN Feng

The Yangtze finless porpoise, known as the "smiling angel" in China, is a species of toothed whale endemic to the Yangtze River. It is also one of the world's most rare freshwater cetacean species.

In the past years, due to illegal fishing, pollution, and vessel traffic, the number of Yangtze finless porpoises declined rapidly. In 2017, after a 52-day Yangtze finless porpoise ecological investigation, the Ministry of Agriculture and Rural Affairs announced that the number of Yangtze finless porpoises was estimated to be only 1,012, of which about 445 were in the main stream of the river.

To save the species from extinction, the Chinese government adopted a series of measures. Many of the recent efforts include the following:

In January 2021, a 10-year fishing ban was implemented in key waters of the Yangtze River.

In February 2021, China elevated the Yangtze finless porpoise to national first-level protected species, the highest level in the List of National Key Protected Wildlife.

On March 1, 2021, the country's first river protection law, the *Yangtze River Protection Law*, came into effect.

A year later, the ecological environment of the Yangtze River has undergone great changes, and more finless porpoises have been captured.

"The underwater noise in the near-shore area of the Yangtze River has been reduced, because disorderly riverside

ports have been renovated or closed down, and some places have even been restored to more hospitable environments. Finless porpoises can currently use these nearshore waters to inhabit," said Wang Kexiong, a researcher at the Institute of Hydrobiology, Chinese Academy of Sciences, whose research team has often carried out scientific research on the Yangtze River's ecology.

Wang added that now finless porpoises can follow fish over a wider area. Where there are fish, the finless porpoises can now prey freely.

Establishing in-situ nature reserves is another effort being made by China to protect endangered species.

In recent years, the country has set up eight in-situ nature reserves, three ex-situ nature reserves and one semi-natu-

ral ex-situ site along the Yangtze River, helping the habitat of the Yangtze finless porpoise improve immeasurably.

To further protect the species, Wang noted that it is necessary to invest more technology and resources to monitor the underwater living environment and activities of the species.

"The current monitoring system mainly relies on imaging equipment, which is usually used to monitor human activities on the water, but cannot directly monitor underwater activities of finless porpoises," said Wang, adding that although some nature reserves have carried out real-time underwater acoustic monitoring and early warning of finless porpoises, the number of monitoring points still needs to be increased.

Protecting Underwater Cultural Heritage

By ZHONG Jianli

Salvage work on the largest and most well-preserved wooden shipwreck discovered by China's underwater ar-



Some porcelains discovered in the Yangtze River Estuary No.2 ancient ship. (PHOTO: XINHUA)

chaeologists, the Yangtze River Estuary No. 2 ancient ship, officially began in early March.

The vessel was a trade ship during the Tongzhi period of the Qing Dynasty (1862-1875). At present, it is resting underwater in the Hengsha Shoal, northeast Shanghai.

Archaeological surveys show that the ship is about 38.5 meters long and 7.8 meters wide at the center, and carries exquisite cultural relics, including porcelains.

To salvage it, the world's most advanced equipment and technology will be used.

Relying on China's high-end manufacturing capability, a huge arch-shaped box will be used to wrap the whole ship,

which will then be hoisted up.

The total weight of the box, with the ship inside, will be nearly 10,000 tons, which includes sand and sea water.

The innovative solution will merge advanced technologies such as tunnel shield and hydraulic pressure hoisting, which have never been used in cultural relics conservation and archaeological fields.

The Yangtze River Estuary No.2 is another milestone in China's underwater archaeology, after the Nanhai No.1 shipwreck was found in 1987 and salvaged in 2007.

This is testament to the country's constant efforts to discover and protect cultural relics, including those lying underwater.

In October 2021, the Yangtze River Estuary No.2 ancient ship was listed as a major underwater archaeological project by China's 14th Five-Year Plan for Cultural Heritage Protection and Sci-Tech Innovation.

On April 1, the country's revised *Regulation on the Administration of the Protection of Underwater Cultural Heritage* will come into effect, which will provide a more definitive guarantee for protecting underwater cultural relics.

The salvage and relocation work of the Yangtze River Estuary No.2 is expected to be completed by the end of the year, according to a spokesperson at the Shanghai Municipal Administration of Cultural Heritage.

From page 1

According to Song, currently each PCR equipment could only complete around about 1,600 test samples, even if it runs 24 hours a day. With the new kit, this figure will be greatly increased.

Apart from accelerating the detection process, the new test kit also maintains a high level of sensitivity, with the limit of detection (LOD) reaching

New PCR Detection Kit to Accelerate Mass Screening

200 copies/ml, whereas the average level of LOD in the industry is 375 copies/ml. The lower the LOD, the more sensitive the test kit is. This also means that the test kit with lower LOD could de-

tect samples with lower virus concentration, reducing the risk of missed detection.

Covering ORF1ab and N genes of the novel coronavirus, the test kit is val-

id for 12 months and can be used 10 times via freeze-thaw cycles, with stable experiment results.

The new test kit was developed by a local company in Shanghai. "Previously, many innovative moves in medical tests came from big foreign enterprises, so it is commendable for a domestic company to have developed such a product," said Song.

Policy Watch

Enterprise Tech Innovation Drives China's Development

By CHEN Chunyou

Enterprises, whether state-owned or private, have played an increasingly prominent role in leading China's sci-tech innovation.

In February this year, Sinovac Biotech said it would invest 10 billion RMB in supporting basic research, R&D and industrialization of biomedicine in the next five years.

According to Wang Zhigang, minister of science and technology, currently in China, 76 percent of national total social R&D investment comes from enterprises. And in 2021, more than 860 key national R&D projects were approved nationally, among which about 680 projects were led, or participated in, by enterprises.

In the revised *Law on Progress of Science and Technology*, more preferential policies are introduced to the development of enterprises. Article 41 stipulates that enterprises' R&D expenses in developing new technologies, new products and new processes can enjoy an additional deduction before tax. And in article 43, small and medium-sized technological enterprises are included on the list for getting favorable tax concessions.

In order to improve the sense of engagement of enterprises in national innovation, article 39 stipulates that China would support the enterprises in taking the lead in making breakthroughs in national core technologies, and encourage them to fully play the role as agents in making decisions to advance technological innovation, increasing R&D investment, organizing the R&D activities and promoting commercialization of sci-tech achievements.

The country is to cultivate influential and highly-competitive leading sci-tech enterprises, and allow them to be the engine driving innovation, says article 39.

Article 42 stipulates that China will perfect the mechanism for innovation, and support qualified sci-tech enterpris-

es in advancing their development in the capital market. In order to let the enterprises develop freely, article 42 specifies that the country would improve the financing system for the sci-tech enterprises to list on the stock market, enrich this channel for financing, and make full use of the financing function of the capital market in serving technological innovation.

The law also emphasizes the responsibility of state-owned enterprises (SOEs). The SOEs account for a large proportion in the national economy. If all SOEs make their contributions to the key sci-tech areas, then the national competitiveness will be greatly enhanced.

Article 46 stipulates that the SOEs should establish and improve the R&D investment system, distribution system and evaluation system, which are conducive to technological innovation, and improve the incentive and restraint mechanism.

For the sake of stimulating the innovation vitality of SOEs, the law also sets clear requirements for the corporate executives. Article 46 stipulates that the chief executives should be responsible for the technological progress of the enterprise, noting that the enterprise's innovation investment, innovation capacity building and innovation results should be taken into account when assessing the performance of the corporate executives. This will undoubtedly ensure the enterprise's technological progress.

This March, the Bureau of Sci-Tech Innovation and Social Responsibility was founded by the State-owned Asset Supervision and Administration Commission (SASAC) of the State Council, which is also an effort to accelerate the innovation capacity of central SOEs.

Hao Peng, director of the SASAC, said that the bureau will strengthen the role of enterprises as innovation agents, and work for the optimization of an ecological environment for sci-tech innovation, so as to stimulate the innovation potential of central SOEs.



A flock of egrets flies over the Sanya River, presenting a sense of liveliness to the tranquil scene. (PHOTO: VCG)

Hainan, a Carbon Trading Model for Green Development

By CHEN Chunyou

Approval has been given to establish the Hainan International Carbon Emission Trading Center (Hainan Carbon Center) in Sanya, Hainan province, which is expected to be put into operation in the latter half of 2022.

The Hainan Carbon Center is an important part of China's national green development strategy. Based on a market-oriented ecological compensation mechanism, it aims to push ahead with low-carbon transition through carbon finance, a term referred to as the financing for purchasing greenhouse-gas-emission quotas to offset emissions.

Hainan has a sound ecological environment and rich natural resources, especially blue carbon resources. The construction of the center is therefore an important pilot operation for this financial initiative opening to the world.

The center will promote Hainan's blue carbon methodology to become an internationally recognized standard, and incorporate into the global ocean governance system through the market trading of blue carbon products, according to a preparatory meeting on the construction of the center, held in Haikou, Hainan's capital city, on March 18.

In addition, the center will provide a strong capital market support platform for various carbon financial products. The fund pooled from the carbon financial market, will also provide powerful financial support for the transformation of enterprises.

The center is expected to serve the national green and low-carbon development strategy, because it will not only promote the energy structure adjustment, but also promote the double reduction of total carbon emissions and energy consumption increments.