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LEAD ARTICLE

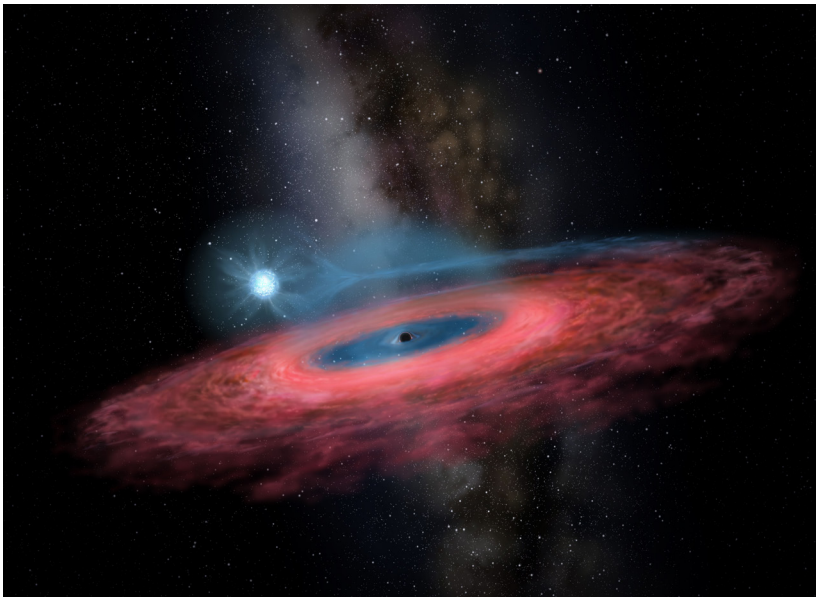

Figure LB-1: Accretion of gas onto a stellar black hole from its blue companion star, through a truncated accretion disk (artist's impression)
[IMAGE: YU JINGCHUAN, BEIJING PLANETARIUM, 2019]

Biggest stellar-mass black hole discovered

An international team of scientists led by China has discovered a king-size, stellar black hole with a mass 70 times greater than the Sun's, right in Earth's "cosmic backyard". It is the biggest known black hole of its kind and roughly three times bigger than what scientists previously thought was possible, researchers said on November 28.

The discovery challenged astronomers' understanding of the formation models for black holes of that type, and provided a new way to find similar black holes in the Milky Way galaxy that may lead to new theories for black hole astrophysics and stellar evolution.

The black hole, named LB-1, was found slowly devouring gas from a nearby star more than 13,800 light-years from Earth, relatively nearby, considering the estimated 105,700 light-year diameter of Earth's galaxy.

"It is like a 'little emperor' of a black hole in our cosmic backyard," said Liu Jifeng, deputy director of the National Astronomical Observatory of China and lead researcher for the discovery.

Scientists believed that stellar-mass black holes were created when massive stars died and collapsed, but current theoretical calculations show that no matter how big the star initially was, the mass of the final black hole cannot exceed 25 solar masses if the star is rich in metals, as is the newly discovered one.

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Academy seeks more world input on science

The president of the Chinese Academy of Sciences, Bai Chunli, said in mid-November that CAS will increase its support of efficient, win-win global scientific cooperation and strive to attract more foreign talents to work in China.

The academy will also play bigger roles in major international scientific projects that can push the envelope of science and jointly address shared challenges worldwide, he added.

CAS, China's highest academic institution, seeks more global collaboration in clean energy, high-energy physics, space science, deep-sea exploration, brain science, synthetic biology, stem cell research, environmental studies on the Qinghai-Tibetan Plateau and other fields — all of which will contribute to fulfilling the United Nations' 2030 Sustainable Development Goals.

It will also conduct more scientific exchanges and practical cooperation under the framework of the Alliance of International Science Organizations, which was launched last year by CAS and 36 worldwide scientific organizations to promote sustainable development and capacity-building in addressing the world's most urgent regional and global scientific challenges.

In 2013, President Xi Jinping asked the academy to pioneer four major areas, including becoming a world-class scientific research institution. On Nov 19, the academy met to discuss international development and lay the groundwork for future scientific outreach and cooperation. It aimed to advance its Pioneering Initiative, a set of plans and reforms to meet Xi's four expectations by 2030.

Bai said that the academy's international sci-tech cooperation began in 1950. After years of effort, it has now entered a "new stage in international cooperation", which is evident in the increasing number of partnering international science organizations, foreign employees and joint overseas research and education centers, as well as in China's playing a more active role in global scientific research and governance since 2013, he said.

As of November, the academy can count more than 210 cooperation agreements in effect with entities in 61 countries. Chinese scientists from various institutes of the academy have co-authored some 12,000 research papers with foreign partners from more than 130 countries, and more than half of the academy's most-cited papers were produced jointly with foreign peers.

In the mid-1990s, there were only around 150 foreign scholars doing research at the academy. Now, that figure has grown to 1,600 experts from more than 60 countries, accounting for nearly three percent of the academy's total researchers, Bai said.

Nearly 20,000 foreign scientists now visit the academy annually to attend workshops, symposiums, conferences or other scientific exchange programs.

China also went from shouldering little of the workload for the Human Genome Project in the late 1990s to now being a key participant in many global scientific mega projects. Those projects include creating clean energy via nuclear fusion at the International Thermonuclear Experimental Reactor and building the Square Kilometer Array, the world's largest telescope.

The academy has established 10 academy-level joint overseas research and education centers with foreign partners in Asia, Africa and Latin America. These centers cover areas of basic research such as astronomy, space weather, Earth sciences and fields crucial to the region's socioeconomic development, such as ecology and environmental protection, biodiversity, biomedicine, water and food security.

"We have built a preliminary mechanism and environment for attracting global scientific and technological experts, and have actively extended our hands for innovation and cooperation to the world," Bai said.

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Next year will be the final year for the nation's 13th Five-Year Plan (2016-20) and the start of the preparation phase for the next plan, which will include the nation's scientific development strategy for 2021 to 2035.

"Our nation's transformation into an innovative one is entering a crucial stage, and our academy is at a critical juncture of breaking bottlenecks and achieving leaps in innovative development," he said.

Zhang Yaping, vice-president of the academy, said its level of internationalization is still relatively low compared with other world-class research organizations, such as the Max Planck Society and the French National Center for Scientific Research.

Zhang said the academy's various institutions should work collectively to expand their global partner network, launch new science projects or platforms with international partners and turn the academy into a global science brand that serves as one of the ideal destinations for foreign talents.

Li Yin, director of the academy's Bureau of International Cooperation, said the academy has been "the key that opened China's scientific community to the world", the "trailblazer that set many milestones for China's global science collaboration", and the "accelerator for global scientific research and innovation".

Li said improving the academy and its institutions' "soft environment" — such as better services to attract and support foreign talents — will be one of the priorities in the following decade as the academy transforms into a world-class research powerhouse.

Source: China Daily

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"When a giant star born in our galaxy approaches the end of its life, it must shed most of its gas in powerful stellar winds," Liu said. "Therefore, it should not leave such a massive remnant like LB-1. It is an extraordinary find and we may have to revamp our models to explain its formation."

One hypothesis is that LB-1 was created when two smaller black holes merged, he said. The merging of black holes is one of the most energetic events in the universe, capable of creating ripples in space-time known as gravitational waves, which were first detected in 2015.

"This discovery forces us to reexamine our models of how stellar-mass black holes form," said David Reitze, executive director of the Laser Interferometer Gravitational-Wave Observatory Laboratory.

"This remarkable result, along with the … detections of binary black hole collisions during the past four years, really points toward a renaissance in our understanding of black hole astrophysics," he said in a scientific review.

LB-1 was first spotted by Chinese scientists in 2016 using spectrum data collected by the Large Sky Area Multi-Object Fiber Spectroscopic Telescope, the world's largest spectral survey telescope, located in Hebei province.

An international team of 55 scientists from 28 research institutions in seven nations, including China, the United States and Spain, worked together in the past three years to confirm the discovery. The findings were published on November 28 in the journal *Nature*.

Stellar-mass black holes, with masses estimated to range from three to 100 times that of the sun, are much smaller than supermassive black holes. Sagittarius A, the supermassive black hole at the center of our galaxy, is about 4.3 million solar mass.

There should be over 100 million stellar-mass black holes in the Milky Way, yet scientists have only discovered around 20, all below 20 times solar mass, due to their relatively small size and ability to absorb all light, said Liu.

"We typically look for stellar-mass black holes by looking at the X-ray signals emitted when their immense gravity is gobbling up gas from a nearby star," he said. "But this method will inevitably leave out most black holes because not all of them are engaged in a cosmic banquet and thus do not emit X-rays."

To overcome this obstacle, scientists used the powerful spectrum surveying capability of LAMOST, the Hebei telescope, to find stars that are seemingly orbiting an invisible object. Though this technique was first proposed in the 18th century, it is an extremely time-consuming process that has only become feasible with recent improvements in telescopes and detectors.

Cui Xiangqun, the chief engineer for LAMOST's operation and development, said the discovery of LB-1 has proved the feasibility and efficiency of using LAMOST to carry out such techniques. China has launched a "black-hole hunter" initiative to search out nearly 100 stellar-mass black holes in the Milky Way galaxy in the next five years.

Roberto Soria, a professor of astrophysics at the University of the Chinese Academy of Sciences, said global cooperation plays a key part in the latest discovery.

"The universe is so big that no astronomy research can be done quickly with one telescope alone," he said.

Source: China Daily

Better coverage database for human genome variation developed

A recent study led by Dr. Xu Shuhua from the CAS-MPG Partner Institute for Computational Biology, Shanghai Institute of Nutrition and Health of the Chinese Academy of Sciences (CAS), created a genome variation resource/database, PGG.SNV (https://www.pggsnv.org) which archives 265 million single nucleotide variations (SNVs) across 220,147 present-day genomes and 1,018 ancient genomes, including 1,009 newly sequenced genomes, representing 977 global populations.

PGG.SNV significantly improves the coverage of Asian populations which are significantly under-represented in other available database such as gnomAD. Compared with the available database, another unique feature of the PGG.SNV is that it provides an estimation of population genetic diversity and evolutionary parameters.

Despite Asia being the Earth's largest and most populous continent, most of the genomic studies have been conducted in Europe and the United States. Accordingly, currently available human genome variation resources are based on populations of European ancestry. For example, nearly half of the genomes in gnomAD are of European ancestry and merely 9% of the genomes are of African ancestry, resulting in an enormous number of variants harbored in Asian genomes that cannot be observed in the extensively studied populations of European ancestry. Moreover, samples in gnomAD were merely classified into groups, mainly on the continental level, leaving the majority of the specific ethnic groups unknown. For example, gnomAD groups East Asians roughly into three categories: "Korean", "Japanese" and "other East Asians". Therefore, researchers fail to query the allele frequencies for most East Asian populations.

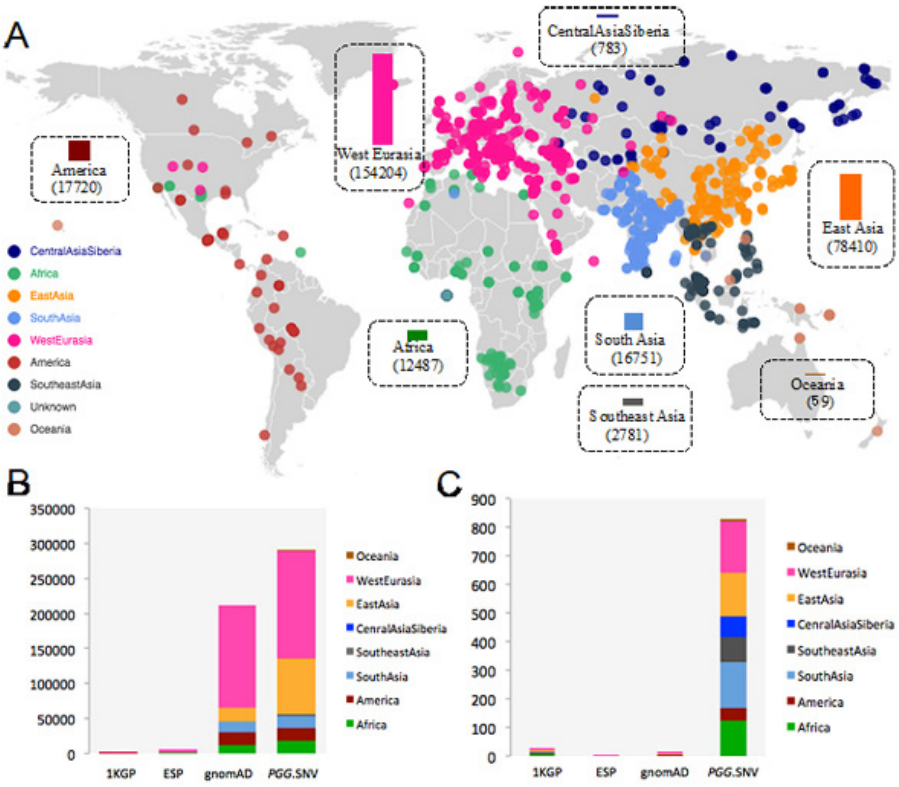

Figure 1: An overview of geographical distribution of human populations covered by PGG.SNV genome data (A)The distribution of human populations covered by the PGG.SNV database and the statistical number of genomes; (B) Comparison of PGG.SNV and gnomAD etc. in terms of genome numbers; (C) Comparison of PGG.SNV and gnomAD etc. in terms of number of populations [IMAGE: DR. XU SHUHUA'S GROUP]

Compared to other frequently used data sets, PGG.SNV documents more genomes and represents a much more comprehensive genomic diversity of worldwide populations. For instance, there are 90,514 Asian genomes included in PGG.SNV, compared to 993 and 25,285 in the 1KGP and gnomAD data sets, respectively. Moreover, PGG.SNV includes 1,009 newly-generated whole genome sequences from 16 ethnic groups, especially many indigenous groups living in East Asia and Southeast Asia whose genomes have not been sequenced before. Beside present-day human populations, the database integrates 1,018 ancient genomes that represent time periods from the 430,000 years before the present day up to the early 20th century, which is rarely considered in many other existing databases.

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CAS President Bai Chunli visits the CADIC. [IMAGE: BUREAU OF INTERNATIONAL COOPERATION, CHINESE ACADEMY OF SCIENCES]

CAS promotes cooperation with counterparts in Morocco and Argentina

A delegation led by Bai Chunli, president of the Chinese Academy of Sciences, was invited to visit the Hassan II Academy for Science and Technology of Morocco and Argentina's National Scientific and Technical Research Council (Spanish: Consejo Nacional de Investigaciones Científicas y Técnicas), CONICET, from November 28 to December 6.

The tour of the CAS delegation was undertaken to promote exchanges and cooperation in scientific research, construction of the Alliance of International Science Organizations (ANSO) in the Belt and Road region and personnel training.

At a meeting with Omar Fehri, head of the Hassan II Academy for Science and Technology of Morocco, Bai reviewed cooperation progress between the two academies since they signed an agreement on research and personnel cultivation in 2012.

Bai briefed Fehri on ANSO's progress and plans and thanked the Hassan II Academy for Science and Technology for joining the alliance as a founding member.

Fehri introduced the Hassan II Academy for Science and Technology and its achievements in technological consultation, scientific research funding, science popularization and international sci-tech cooperation since its establishment in 2006.

He appreciated China's remarkable achievements in economic and social development and sci-tech innovation, expressed the academy's honor at being a founding member of ANSO and spoke highly of its progress in the past year.

He said that he will participate in the second General Assembly of ANSO in Russia in May 2020, and hoped to further strengthen cooperation with CAS.

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After in-depth discussions on future cooperation, they reached several consensuses, including holding an ANSO-based joint seminar on industry-university-research cooperation involving big data, supercomputing and artificial intelligence technologies in Morocco in April 2020 and developing a joint mechanism for scholarships and academic exchange visits.

Bai and Fehri then renewed the cooperation agreement.

In Argentina, Bai visited CONICET, where he had talks with its acting president Miguel Laborde.

They briefed each other on their institutions and exchanged ideas on the progress of major projects, ANSO's construction and development, and future cooperation.

Bai focused his speech on the CAS President's International Fellowship Initiative (PIFI) and the ANSO background, hoping more researchers and students will choose to work and study in CAS with the help of the PIFI program.

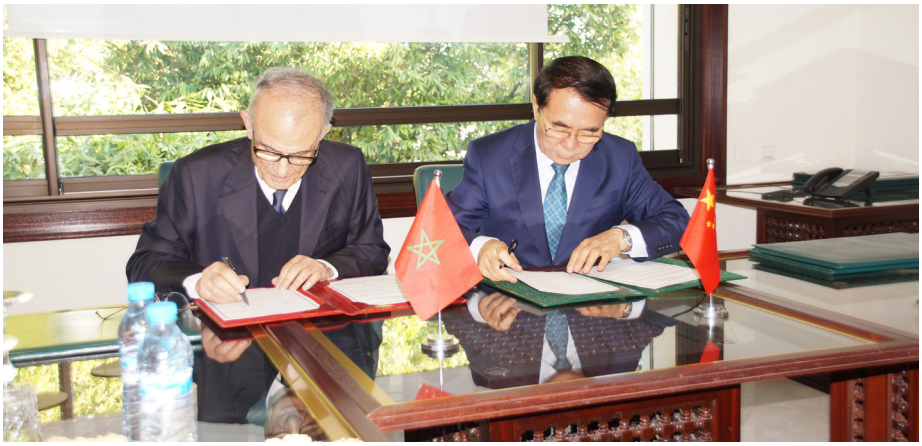
He also invited CONICET to join ANSO and take part in ANSO affairs. Laborde said the organization would consider Bai's invitation.

According to an agreement for a new round of cooperation signed by Bai and Laborde after their meeting, they will set up a joint scientific research center.

Tariff exemptions are expected to be granted to the center's instruments and equipment exported to Argentina; at the same time, the two sides will establish a cooperation mechanism under the framework of the agreement to promote practical collaboration in prioritized areas such as astronomy, polar and ocean research and biomedicine.

In Argentina, Bai met with Rodev Sanchez, head of the Argentine Antarctic Institute (Spanish: Instituto Antartico Argentino), IAA, and held talks with Gustavo Ferreyra, head of the Argentina Polar and Marine Scientific Research Center, or CADIC, and Adriana Justro, vice president of the Argentine National University of Tierra del Fuego to promote scientific investigation, cooperative research and data sharing.

Bai Chunli (R) shakes hands with CONICET's acting president Miguel Laborde. [IMAGE: BUREAU OF INTERNATIONAL COOPERATION, CHINESE ACADEMY OF SCIENCES]



Bai and Omar Fehri, head of the Hassan II Academy for Science and Technology of Morocco, sign a cooperation agreement. [IMAGE: BUREAU OF INTERNATIONAL COOPERATION, CHINESE ACADEMY OF SCIENCES]

Bai pointed out that CAS is actively promoting the "three poles" science plan and that Antarctica is an indispensable part of the polar research.

He called on both sides to deploy their own advantages, actively carry out exchanges and cooperation and build channels and platforms through mutual visits and joint seminars to realize mutually beneficial and win-win scientific research cooperation.

The Argentine institutions welcomed Bai's proposal and agreed to promote exchanges and cooperation with CAS in polar areas, oceans and other fields, and to jointly enhance the cultivation of young talents.

During the tour in Morocco and Argentina, Bai also met with Chinese Ambassador to Morocco Li Li and Chinese Ambassador to Argentina Zou Xiaoli, exchanging ideas on strengthening sci-tech cooperation between CAS and the two countries.

Representatives from the Bureau of International Cooperation, Aerospace Information Research Institute, and the National Astronomical Observatories of CAS also joined the delegation.

Source: Bureau of International Cooperation, Chinese Academy of Sciences

My experience in China

Recently, I was appointed to the rank of Associate Professor. Meanwhile I gained a wealth of experience during my Postdoctoral Research Fellowship, courtesy of the CAS-PIFI programme at the Center for Neural Engineering, Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences.

As a young Nigerian academic who is enthusiastic about advancing science and technology through Artificial Intelligence concepts with a goal of providing affordable and lasting solutions to real-life problems, shortly after obtaining my master's degree I received a CAS-TWAS Presidents' fellowship award in 2014 to pursue a PhD at the University of the Chinese Academy of Sciences (UCAS) under the mentorship of Prof. Li Guanglin.

I considered it a big opportunity to pursue a doctoral degree as well as my scientific dream outside the shores of my dear country of Nigeria mainly because I was curious to experience science and education in other parts of the world. Remarkably, at that time, China had the fastest growing economy with lots of emerging technological tools and devices. Shortly after arriving at the International College of UCAS (IC-UCAS) located in Haidian District, Beijing, on September 5, 2014, I completed the official registration for my PhD admission (I signed up for a total of five courses including three Chinese and two Professional). Interestingly, the mix of learning about Chinese language and its rich cultural heritage truly made my experience at UCAS exciting. The teaching style adopted by my teachers at UCAS helped me to gain a lot of experience from the courses within a relatively short period of time, which I suppose accounted for my receiving excellent grades after the completion of the courses. It was challenging but worth it because by the end of my courses I had acquired a reasonable degree of knowledge that was helpful for my PhD research work.

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This style of instruction simply reflects the connection between teaching and research in China's educational system, which enables one to learn a great deal within a relatively short time-frame.

Upon successful completion of my PhD courses in Beijing I joined the Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences (SIAT-CAS) in January 2015, and immediately commenced my research work under the supervision of Prof. Li Guanglin. Motivated by the need to develop the next-generation rehabilitation robot control mechanism for motor function restoration in the constantly increasing range of people with limb disability, I focused my research on understanding the biomechanics of upper extremity motor function and how related movement intent could be adequately decoded from biological signals. I have done a number of related projects, one of which was to resolve the adverse impact of mobility. That is, a systematic framework was firstly designed to investigate the adverse impact of mobility (a critical issue that has not been examined before now) on decoding multiple-patterns of targeted limb movement intents. The investigation was conducted based on surface electromyogram (sEMG) and accelerometer mechanomyogram (ACCmmg) signals acquired simultaneously from six upper-limb amputees across a static scenario and three non-static scenarios, which performed seven classes of pre-defined limb movements. The experimental results obviously indicated that mobility could substantially affect the overall performance of multiple degrees of freedom of upper-limb prostheses. Interestingly, with the aid of a Dual-Stage Sequential technique which I proposed, the adverse impact of mobility on decoding multiple-patterns of targeted limb movement intents was significantly mitigated, making it the first study to address such a problem to the best of my knowledge.

There is no doubt that I faced several challenges during my PhD research period, to the extent that I thought quitting would be the best option, particularly during the first six months. However, as I was strongly encouraged by my zeal for scientific research and had the support of my family and my team, things began to take shape as time went on. Interestingly, two of the feature extraction methods I proposed are currently being utilized in my research team and also by notable researchers in my field around the world. The relevance of my works generated several awards and honors including a distinguished PhD dissertation, a best academic paper award, excellent foreign student as well as excellent international graduate awards, among others. As a Postdoc Research Fellow, I have been privileged to receive a number of research funding awards including the National Natural Science Foundation of China (NSFC) and designation in the CAS President's International Fellowship Initiative as Principal Investigator. I have equally had the privilege of co-investigating a number of international collaborative research projects, and I was also honored with the 2019 IEEE outstanding young investigator research visit award. As part of my research output in the last four years, more than 50 scientific articles have been published in reputable peer-reviewed international Journals (SCI-indexed) and conference proceedings (EI-indexed), and more than 30% of the articles are first author papers.

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Aside from academic research, my family and social life have been worthwhile since I arrived in China. I am married to Mojisola Grace Samuel (Nee Asogbon), who is currently a third year PhD student here in SIAT-CAS, courtesy of the Chinese Government Scholarship (CSC) programme. In fact, we are blessed with two beautiful daughters (Oluwatosin Glory Samuel and Oluwabusola Gift Samuel), both born in Shenzhen, China. Balancing work and family life comes with a lot of challenges but I would say it's been an amazing experience thus far.

Finally, it is worth noting the sponsorship opportunities granted to me by the CAS-TWAS President's fellowship and the CAS-PIFI initiatives were very much instrumental in all of the above mentioned achievements and others from September 2014 till now. Therefore, I say a big thank you to CAS, TWAS, UCAS, SIAT, my supervisor Prof. Li Guanglin, friends, well-wishers, and above all my family and God Almighty. I do hope CAS will continue to provide young talented academics with the opportunity to pursue their dreams.

Oluwarotimi Williams Samuel, PhD, Associate Professor, obtained a doctorate degree in Pattern Recognition and Intelligent Systems from the University of the Chinese Academy of Sciences, Beijing in 2018, courtesy of the CAS-TWAS president's fellowship, receiving several distinguished honors and awards during the program.

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With a comprehensive catalogue of genetic variants and annotations, PGG.SNV enables studies of variants that are rare or not existing in well-studied populations, provides the population prevalence of variants in various populations with little ancestral bias and further guides Mendelian-inherited disease mapping studies. PGG.SNV documents many ancient genomes and compares them with contemporary human genomes, allowing researchers to understand the evolutionary trajectory of genetic variants as well as gene flow or introgression events. Moreover, this database improves interpretations of putative causal loci for Mendelian diseases, population differentiation analysis, and understanding of adaptation to local environments for global populations. Eventually, PGG.SNV will help advance our understanding of the biological meaning of the human genome sequence in light of human evolution.

PGG.SNV provides a web-based user interface to access data. The users can search genetic variants by physical position, RSID, a genomic region, official gene symbol or Ensembl gene name

Figure 2: The main user interface of the PGG.SNV [IMAGE: DR. XU SHUHUA'S GROUP]

etc. PGG.SNV has also embedded a web-based tool (https://www.pggsnv.org/tools.html) for the generation of figures after users have uploaded their own analyses. In addition to the web-based interface, users can query variants using a mobile application (App) by linking to the WeChat official account named PGGbase.

The study was published online in Genome Biology on October 22, 2019, entitled "PGG.SNV: Understanding the evolutionary and medical implications of human single nucleotide variations in diverse populations".

This work was conducted by Dr. Zhang Chao, Dr. Lu Yan, and PhD students Gao Yang from ShanghaiTech University, Ning Zhinlin and a few members from Dr. Xu Shuhua's team.

For more information, please contact:
Wang Jin (Ms.)
Shanghai Institute of Nutrition and Health,
Chinese Academy of Sciences
E-mail: sibssc@sibs.ac.cn

Source: Shanghai Institute of Nutrition and Health, Chinese Academy of Sciences

Study finds Chinese plant biodiversity at risk due to human activity: narrow-ranged plants lose, widespread ones win

With intensifying human activity, many species are threatened with extinction. However, many others have expanded their range. Is there a general rule to identify which species are "losers" and which "winners"? And what is the effect of range changes on the biodiversity of Chinese flora?

A research team led by Prof. Ma Keping from the Institute of Botany of the Chinese Academy of Sciences, in collaboration with scientists from the Center for Biodiversity Dynamics in a Changing World (BIOCHANGE) at Aarhus University (Denmark), revealed that narrow-ranged plants in China, when faced with intensive human activity, are more likely to be "losers", whereas widespread species tend to be "winners" under the same conditions. The study was published in the journal *PNAS* on December 17.

China is one of the world's most species-rich countries, but it has suffered from long-term, intense human pressure exacerbated by uneven human population distribution. For example, most people in China live southeast of an imaginary diagonal line, known as the "Hu Huanyong Line" after the demographer who created it, which stretches from Heihe City in Heilongjiang Province to Tengchong City in Yunnan Province.

Due to the lack of extensive, dynamic species distribution data, relatively few studies have comprehensively evaluated the impact of humans on large-scale species distribution in high-diversity organism groups. Furthermore, such assessments are complicated by natural drivers such as climate.

In order to overcome this knowledge gap, the researchers quantified the impact of humans on the distribution of 9,701 vascular plant species across China. The study factored out the effect of climate by assessing how human activity affects the degree to which each species fills its potential climatic range (i.e., its potential distribution given its statistically estimated climatic niche).

This study found that narrow-ranged species in the human-dominated southeast (i.e., the area below the Hu Huanyong Line) have lower range filling, whereas widespread species have higher range filling relative to their counterparts in the northwest. Furthermore, variation in range filling is strongly associated with human impact factors, with narrow-ranged species having a negative correlation with those factors while widespread species have a positive correlation.

These results suggest that human activity has reduced the range of narrow-ranged species, but expanded the range of widespread species, relative to their climatic potential.

Narrow-ranged species may be more sensitive to human pressure since they are environmentally relatively specialized or poorly dispersed. Conversely, widespread species, as pioneer species, may be more generalistic and/or better dispersed, making them better equipped to exploit human-disturbed habitats.

Fig. 1. A fragmented habitat caused by intense human utilization in Zhejiang Province, China [IMAGE: WANG YUNQUAN]

Fig. 2. (A) Gastrodia elata, a wild medical orchid very rare due to overexploitation; (B) Pinus massoniana, a common tree for afforestation
[IMAGE: CHEN BIN (A), AND ZHANG JINLONG & CHEN GUOKE (B)]

"With narrow-ranged species being replaced by widespread species due to human activities, the Chinese flora risks biotic homogenization," said Dr. Xu Wubing, the first author of the study.

Because narrow-ranged species are more numerous than widespread species, negative human impact on species distribution is likely very prevalent. "This highlights the importance of establishing more protected areas as well as widespread, biodiversity-oriented ecosystem restoration to safeguard China's unique, rich flora," said Professor Jens-Christian Svenning, coauthor of the study and director of BIOCHANGE at Aarhus University.

Source: CAS

The rare bloom you've never seen and may never see

For the first time ever in China, Himalayas saprias, a parasitic flowering plant in Xishuangbanna, Southwest China's Yunnan Province, was photographed in bloom by two Chinese researchers.

The Himalayas sapria is an extremely rare Southeast Asian plant. In China, it is only found in Xishuangbanna and Metok in Tibet, and the exact locations are strictly confidential.

Without stems or leaves, they spend most of their lives unseen, living as parasites on the roots of their host plants until the flowering season, which runs from October to December. In addition, the flower's short blossoming period makes witnessing it nearly impossible.

The 50-second time-lapse shows every bit of the stunning moment when the fist-size balls of wrapped-up petals slowly unfold into a full bloom. However, the historic footage is the result of a more than 30-hour wait, not to mention other preparations beforehand.

"From the first movement of the petals to full bloom, it lasted for about 25 hours," said Dr. Zhu Renbin from Xishuangbanna Tropical Botanical Garden. "We snapped over 2,000 photos with two cameras over that time."

"This is probably also the first time in the world that this flower's blooming process has been filmed," said Dr. Zhu.

Petals slowly unfold and then the full blossom is seen. [IMAGE: ZHU RENBIN]

Himalayas saprias in different flowering phases [IMAGE: ZHU RENBIN]

Little is known about the rare plant, making this footage an important reference for scientists to further study the plant's characteristics, such as its pollination pattern, said Dr. Zhu.

After one discovery in 1987, the supposedly extinct plant wasn't seen again until 2016. As a typical tropical rainforest plant, its appearance has confirmed the existence of such forests in China's Xishuangbanna.

Source: CGTN

Chinese institutions rise fast in Nature Index Materials Science

Chinese institutions have seen rapid increase in materials science research output in the *Nature Index*.

According to the latest *Nature Index 2019 Materials Science*, a total of 43 Chinese institutions were ranked among the 50 institutions worldwide with the fastest-rising output in materials science between 2015 and 2018.

The index is based on the annual *Nature Index* that tracks contributions to research articles published in 82 natural science journals. It is considered an indicator of global high-quality research output and collaboration.

The top 10 institutions that clocked the fastest-rising output in materials science are all from China, including the University of the Chinese Academy of Sciences, Nankai University and Zhejiang University.

The index also looked at the proportion of materials science research in the total research output tracked by the *Nature Index*.

In Singapore and the Republic of Korea, more than 40 percent of research articles are from materials science. This compares to more than 35 percent in China and about 15 percent in the United States.

Source: Xinhua