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Jump further, leap higher, and consolidate stronger: A brief review of the long-term partnership between Kunming Institute of Zoology (KIZ) and the Chinese University of Hong Kong (CUHK) in bioresources and molecular research

The molecular etiologies of many prevalent diseases stem from genetic variations that arise during evolution and natural selection, as well as from environmental effects. The study of genetic diversity in human populations and analysis of molecular evolution in primates and other animal species can provide important insights regarding the pathogenesis of common diseases in both human and animal populations. Furthermore, the rich bioresources available in Yunnan and adjacent regions, including an array of natural plant and animal products, constitute a natural resource bank for the discovery of prophylaxes against human diseases.

The joint pursuit of knowledge between KIZ and the Faculty of Medicine at CUHK has been ongoing for more than 20 years, with a shared vision to investigate diverse human diseases and phenotypic traits and to identify potential curative lead molecules (Figure 1). Their joint research initiatives began in 1999 when Prof. Yong-Tang Zheng visited Prof. Michael SC Tam's laboratory in Hong Kong to study the anti-viral properties of an anti-ribosomal protein (trichosanthin). Subsequently, in 2003, Prof. Nelson LS Tang visited Prof. Ya-Ping Zhang's laboratory in KIZ to commence a collaborative investigation into genetic predispositions underlying common human diseases. Driven by mutual research interests and initial success and the intention to further enhance collaborations, the two institutes established the KIZ-CUHK Joint Laboratory of Bioresources and Molecular Research in Common Diseases in 2007. Since then, research collaborations have expanded considerably, encompassing areas such as neurophysiology, developmental biology, cancer biology, stem cell biology, and immunology.

The joint laboratory has yielded highly productive and influential research. With more than 390 publications in a variety of high-ranked journals, including *Science*, *Nature Neuroscience*, and *Science Advances*, output from members of the joint laboratory has garnered substantial attention within the field. Noteworthy findings include the identification of genetic adaptation to high altitudes in Tibetan highlanders (Beall et al., 2010; Ji et al., 2012), as featured in a perspective editorial in *Science* (Storz, 2010), and the recent breakthrough in CRISPR-Cas9-mediated mtDNA editing, resolving long-standing controversies regarding whether mtDNA can be edited by CRISPR-Cas9 (Bi et al., 2022). In addition, key members of the joint laboratory have secured three collaborative research grants over the past 5 years, further emphasizing the laboratory's strong record of productivity and impact.

The establishment of the joint laboratory has provided a solid platform for its members to conduct projects in Kunming. The laboratory is one of the top users of research facilities in KIZ, including the National Research Facility for Phenotypic and Genetic Analysis of Model Animals (Primate Facility) (Yao, 2022). Given the abundant and unique bioresources of Yunnan Province, as well as the availability of technological platforms, researchers from the joint laboratory have translated their research into clinical applications. Notably, under the leadership of Prof. Ya-Ping Zhang, KIZ has become a key DNA sample reservoir of ethnic people in China, including Han Chinese from different geographic areas and ethnic minorities. As population structure among Han Chinese from different areas may bias genetic association studies, new disease alleles identified in patient samples by the CUHK team have been further evaluated by KIZ partners to provide details related to population genetics, such as allele frequencies (prevalence) in different geographic areas, subpopulation differentiation of alleles, population history of alleles, and linkage disequilibrium with adjacent loci. Such information is crucial for genetic diagnosis and pharmacogenomics.

In addition to collaborative research, joint conferences are held each year, with the venue alternating between Hong Kong and Kunming. These conferences cover diverse research themes, representing important areas of common interests. Furthermore, both postgraduate and graduate students are provided with the opportunity to present their research findings during the postgraduate research day. The quarterly Principal Investigator Seminar, a new initiative, also provides the opportunity for principal investigators from both institutes to present their achievements and experiences, thus inspiring further collaboration and sharing of ideas, resources, and skills among members of the joint laboratory.

Over the past two decades, the joint laboratory has attained enormous achievements and has been assessed as "Good" based on a CAS-led evaluation. To commemorate and celebrate this long journey, members from the joint laboratory have contributed eight papers to the special column of the

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Figure 1 Important events in the KIZ-CUHK joint laboratory

A–D: Top leaders of the Chinese Academy of Sciences (CAS), including President of CAS, Prof. Chun-Li Bai, in 2013 (A) and 2017 (B), Vice Presidents of CAS, Prof. Ya-Ping Zhang in 2014 (C) and Prof. Tie-Niu Tan in 2016 (D), visited the joint laboratory. E: Governor of Yunnan Province, Mr. Ji-Heng Li, visited the joint laboratory in 2013. F–H: Signing ceremonies of the Collaboration Agreement of the joint laboratory in 2007 (F) and 2012 (G) in Kunming, and in 2018 (H) in Beijing. Presidents of CUHK, Prof. Jao Yiu Joseph Sung, and Prof. Sung Chi Rocky Tuan, Vice President of CUHK, Prof. Wai-Yee Chan, and Directors in General of KIZ, Prof. Ya-Ping Zhang and Prof. Yong-Gang Yao, and other key members of the joint laboratory attended these events in different years.

memorial in this issue (Cao et al., 2023; Hassan et al., 2023; Ho et al., 2023; Li et al., 2023; Rahman et al., 2023; Salmas & Cheung, 2023; Wang et al., 2023; Zhu & Lo, 2023), reflecting the excellent successes of collaboration. We hope that the laboratory will continue to prosper for decades to come.

COMPETING INTERESTS

The authors declare that they have no competing interests.

AUTHORS' CONTRIBUTIONS

Y.G.Y., W.Y.C.., and Y.T.Z. conceived the review. N.T., Y.G.Y., and H.Z. prepared the draft. Y.G.Y., N.T., and H.Z. designed the figure. All authors contributed to the discussions. All authors read and approved the final version of the manuscript.

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