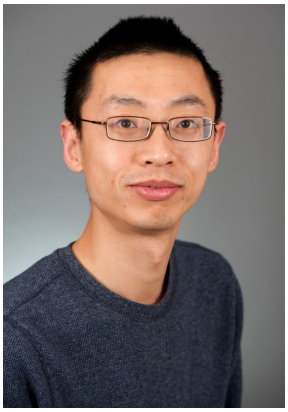
2022 GU XIAOCHENG LECTURE

顾孝诚讲座

The 2022 GU XIAOCHENG LECTURE is awarded to Dr. Peng Du of Peking University.

The Gu Xiaocheng lecture award was established by the Gu Xiaocheng Memorial Fund in 2012. The lectureship recognizes young investigators showing promises to become future leaders in life science research, especially those who work in China.



Dr. Peng Du earned a bachelor's degree from Shandong Normal University in 2006; a doctorate degree from Peking University in 2012. From 2012 to 2018, he carried out his post-doctoral research in Dr. Richard Gregory's laboratory in Harvard Medical School. Dr. Xiao joined Peking University in 2018 as an assistant professor in School of Life Sciences, Peking University and a principal investigator in the Peking University-Tsinghua Joint Center for Life Sciences.

Dr. Peng Du has been engaged in the research of RNA regulation and stem cell biology for a long time. Starting from the identification of novel RNA regulatory pathways, he has developed cutting-edge projects to dissect the function of RNA regulatory pathways in stem cell fate determination and early embryonic development, and ultimately to explore the role of RNA and stem cells in applications of translational medicine. A series of breakthrough results have been achieved, including:

By inhibition of different components of the spliceosome, murine embryonic stem cells are reprogrammed from a pluripotent state to a totipotent state similar to the 2-4 cell stage. A single spliceosome inhibitor was added in the growth medium to establish the *in vitro* culture of totipotent stem cells, and the cells were named as totipotent blastomere like cells (TBLCs). Through combination of single-cell sequencing and mouse chimera experiments, he demonstrated that TBLCs have the ability to differentiate into a variety of different cells inside and outside the embryo. This study is the first to establish the methodology for capturing and culturing totipotent stem cells *in vitro* and surprisingly revealed the important determinant role of the spliceosome in stem cell fate transition.

Additionally, Dr. Du and Harvard University Professor Richard Gregory found that for the miRNA cleavage complex Microprocessor, a core component of the DGCR8 gene has a selective upstream initiation event, resulting in two distinct mRNA transcripts. The shorter transcript skips the neck of an untranslated region loop structure, thus breaking the inherent negative feedback regulation of Microprocessor, and altering the balance between DGCR8 and DROSHA. This allows precise control of global miRNA dosage and influences the differentiation process of the germ layer during early embryonic development. The discovery advanced our understanding of regulation of miRNA transcription, and also provided insights into the early embryonic germ layer.

Dr. Du not only made innovative contributions in research, but also devoted great enthusiasms in the organization and teaching of many courses such as "Theory and Its Application".