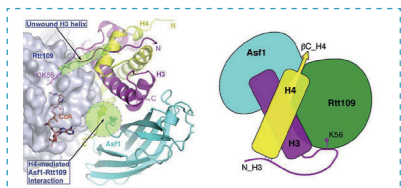


Research Group of Chromatin Structure and Epigenetic Regulation Institute of Biophysics, Chinese Academy of Sciences



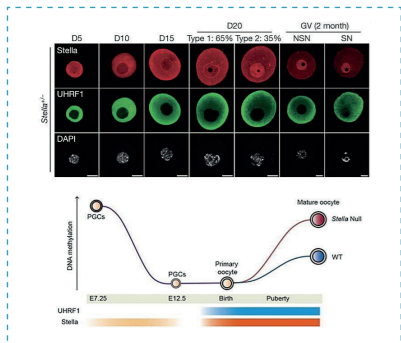
染色质纤维冷冻电镜结构解析设施

Facility for cryo-EM structure determination of the chromatin fiber



ASF1 调控组蛋白乙酰转移酶 Rtt109 酶活性的新机制

Novel mechanism for the regulation of histone acetyltransferase activity of Rtt109 by ASF1



Stella 保障卵子独特 DNA 甲基化谱

Stella safeguards the unique methylation landscape of the oocyte genome

Major contributors

Zhu Ping
Zhu Mingzhao
Li Yingfeng
Zhang Zhuqiang
Zhang Liwei
Zhang Yan
Lü Mengjie

The team focuses on studying chromatin structure and epigenetic regulatory mechanism, has made a number of original scientific breakthroughs through close collaboration and continuous efforts, and significantly promoted China's academic position in the field of chromatin and epigenetics. They determined 3D structures of the 30-nm chromatin fiber by cryo-EM, revealing a novel two-start helical structure with tetranucleosome as the fundamental regulatory structural unit; revealed novel mechanisms governing the regulation of histone acetyltransferase activity of Rtt109 by ASF1 and that for safeguarding the unique methylation landscape of the oocyte genome by Stella; demonstrated that BEND3 prevents premature gene activation by presetting epigenetic modifications at bivalent genes and regulates cell fate transition during development; and uncovered a novel epigenetic mechanism for regulating the selection and activation of early replication origins by histone variant H2A.Z. Their achievements have been cited by internationally renowned textbooks and selected as Top Ten Scientific Advancements in China of Year 2020.

Outstanding contributors of this research group

Xu Ruiming

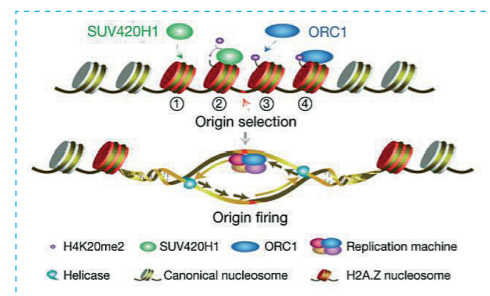
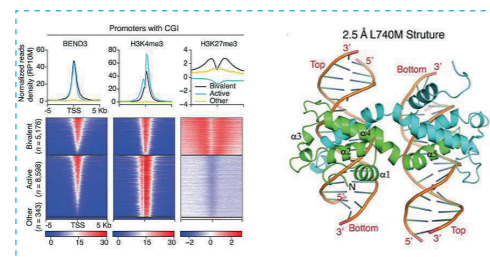
Major Scientific Achievements: He determined the crystal structure of the Rtt109-ASF1-H3-H4 complex, which reveals a novel mechanism for the regulation of histone acetyltransferase Rtt109 by ASF1. He participated in the discovery of BEND3-mediated bivalent gene regulation, and participated in the determination of the 30 nm chromatin fiber structure.

Zhu Bing

Major Scientific Achievements: He uncovered that Stella safeguards the unique methylation landscape of the oocyte genome, and revealed that BEND3 prevents premature gene activation and regulates the cell fate during development.

Li Guohong

Major Scientific Achievements: He solved the 3D cryo-EM structures of the 30-nm chromatin fiber, revealing a novel two-start helical structure twisted with tetranucleosomal units. He uncovered that H2A.Z epigenetically regulates the selection and activation of early replication origins.



H2A.Z 调控 DNA 早期复制起始位点选择和激活的表观机制

H2A.Z epigenetically regulates the selection and activation of early replication origins



研究集体成员合影

Research group photo

染色质结构与表观遗传调控研究集体

推荐单位：中国科学院生物物理研究所

研究集体主要科技贡献：

该研究集体聚焦染色质结构与表观遗传调控机制，通过紧密合作和不懈努力，取得了一系列原创性研究成果，提升了我国在表观遗传学领域的学术地位。解析了高分辨率的 30-nm 染色质纤维结构，揭示左手双螺旋结构模型，并发现“四核小体”调控单元；揭示了组蛋白修饰酶 Rtt109 的调控新机制以及 Stella 调控卵子独特 DNA 甲基化谱的新机制；发现 BEND3 能对将来状态下需要激活的基因预先进行表观调控，预防这些基因因为过早激活而导致细胞命运决定的失败；发现 DNA 复制位点选择或激活的表观遗传调控机制。其中“30-nm 染色质纤维结构”成果入选多部国际本科教科书，“揭示人类遗传物质传递的关键步骤”成果入选 2020 年度“中国科学十大进展”。

研究集体突出贡献者



许瑞明 Xu Ruiming

许瑞明 中国科学院生物物理研究所

主要科技贡献：揭示了 ASF1 调控组蛋白乙酰转移酶 Rtt109 酶活性的新机制，参与发现了 BEND3 调控未来状态下基因表达的表观机制，以及 30 纳米染色质结构的解析。



朱冰 Zhu Bing

朱冰 中国科学院生物物理研究所

主要科技贡献：揭示 Stella 保障卵子 DNA 甲基化谱的新机制，发现 BEND3 调控未来状态下基因表达的表观新机制。



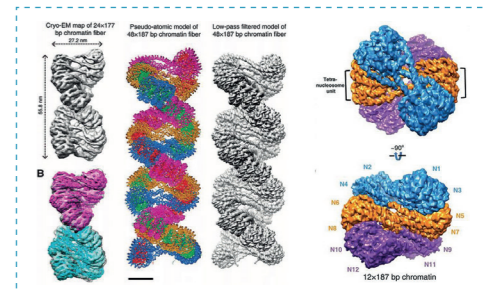
李国红 Li Guohong

李国红 中国科学院生物物理研究所

主要科技贡献：解析 30-nm 染色质纤维结构，发现“四核小体”调控单元，揭示 DNA 复制位点选择或激活的表观新机制。

研究集体主要完成者

朱平 朱明昭 李颖峰 张珠强 张力垸 张彦 吕梦捷



30-nm 染色质纤维的三维冷冻结构

3D cryo-EM structures of the 30-nm chromatin fiber



30-nm 染色质纤维结构解析的影响

Impact of the solved 30-nm chromatin fiber structure

30-nm 染色质纤维结构被录入多部国际知名生物学教科书

DNA 复制起始位点表观遗传调控研究成果的影响
Recognitions for the discovery of epigenetic regulation of DNA replication origins

