23.09.2020

Science news

By G.Timokhin

1. A new 3D-genomics method has been introduced

RESOURCE | VOLUME 182, ISSUE 6, P1641-1659.E26, SEPTEMBER 17, 2020

Genome-Scale Imaging of the 3D Organization and Transcriptional Activity of Chromatin

Jun-Han Su[4] • Pu Zheng[4] • Seon S. Kinrot[4] • Bogdan Bintu[4] • Xiaowei Zhuang[5]

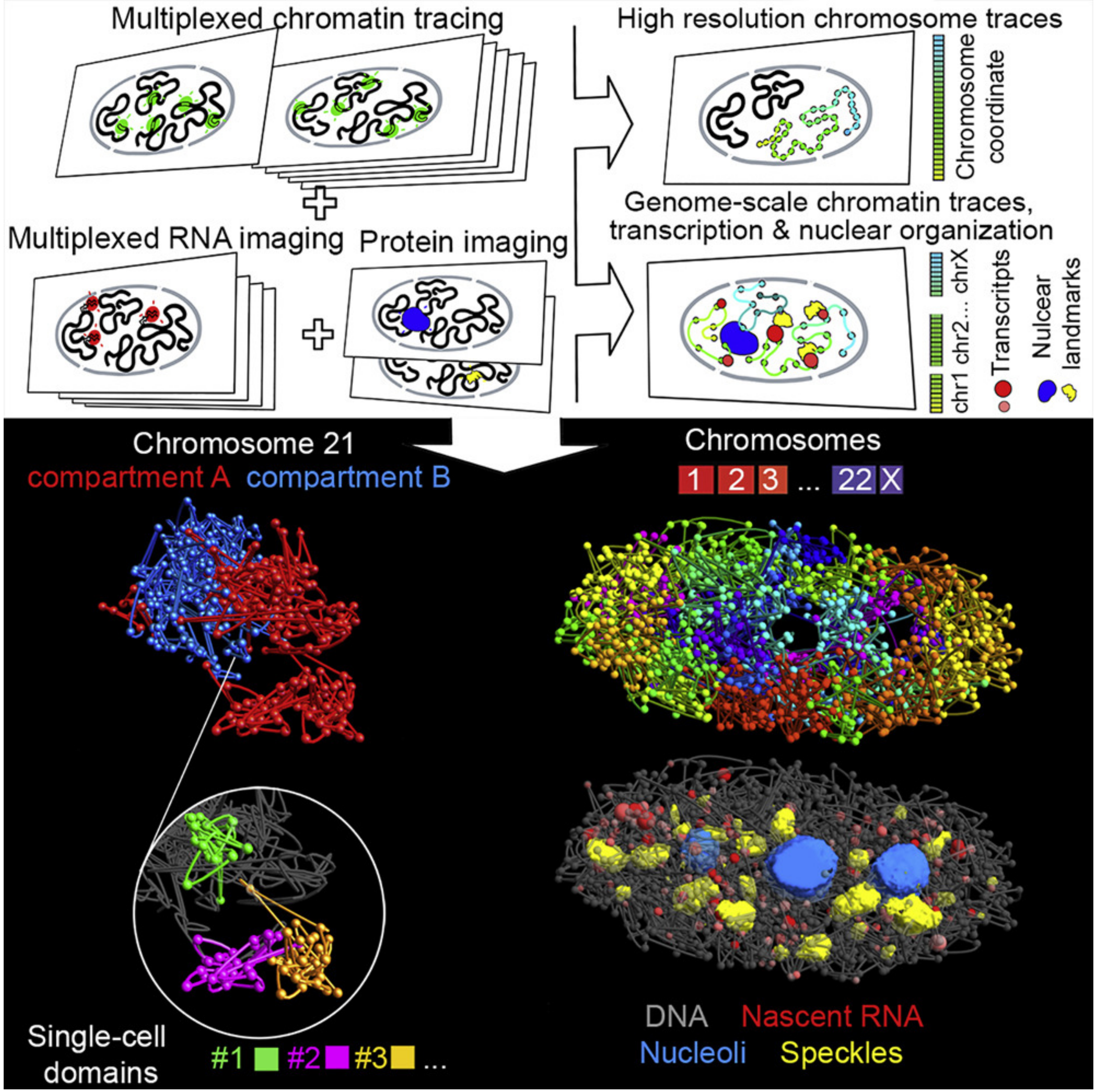
Published: August 20, 2020 • DOI: https://doi.org/10.1016/j.cell.2020.07.032

- Single Cell
- Multiple Scales
- High genomic throughput

1. **High-resolution conformation tracing of whole chromosomes by sequential hybridization**

2. **A multiplexed error-robust fluorescence *in situ* hybridization (MERFISH)-based method for genome-scale chromatin tracing**

3. **Helps to characterize chromatin domains, compartments, and *trans*-chromosomal interactions and their relationship to transcription in single cells**



2. Large-Scale Topological Changes Restrain Malignant Progression in Colorectal Cancer

ARTICLE | VOLUME 182, ISSUE 6, P1474-1489.E23, SEPTEMBER 17, 2020

Large-Scale Topological Changes Restrain Malignant Progression in Colorectal Cancer

Sarah E. Johnstone [10] • Alejandro Reyes [10] • Yifeng Qi • ... Bin Zhang • Martin J. Aryee • Bradley E. Bernstein [11] • Show all authors • Show footnotes

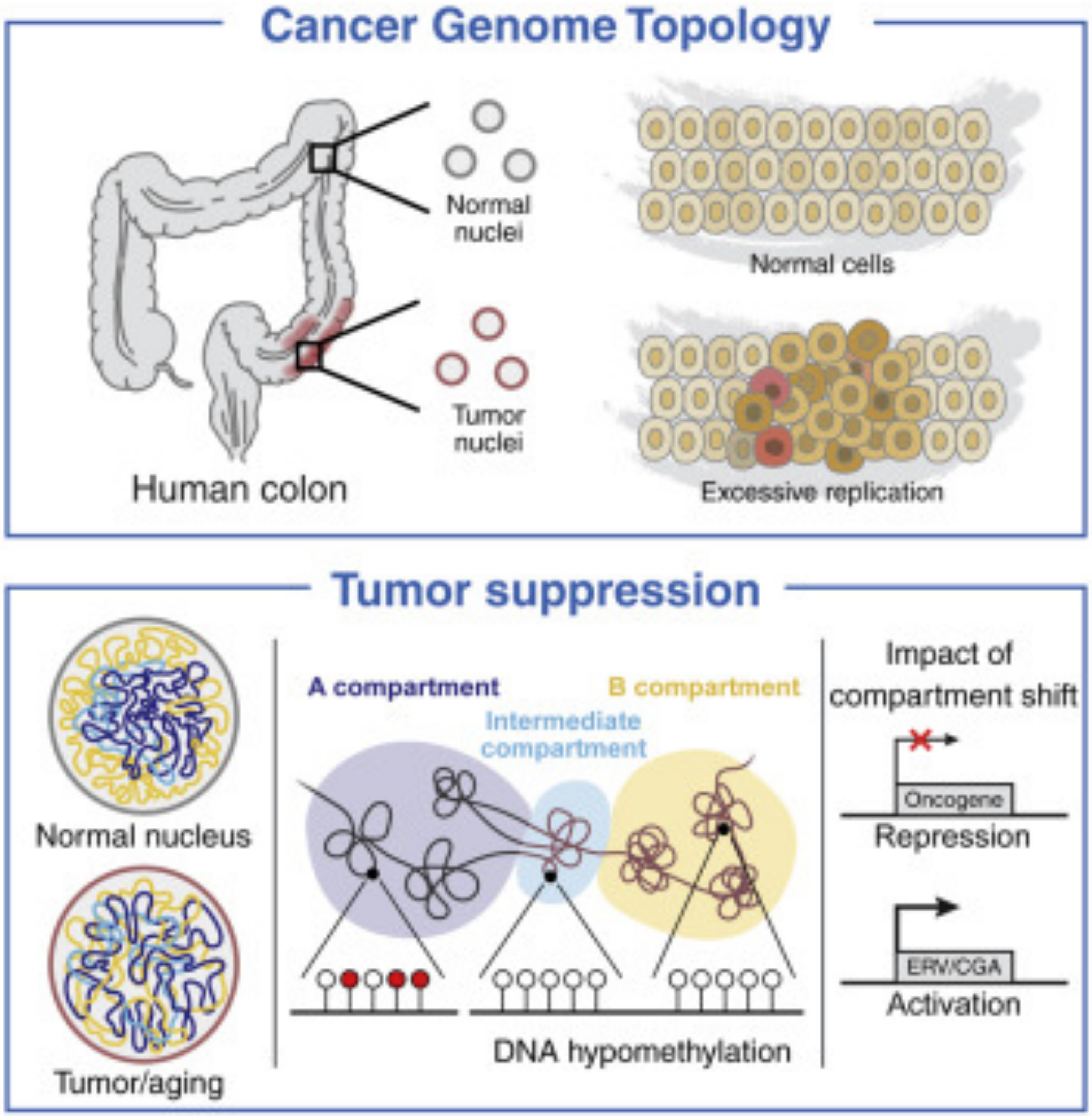
Published: August 24, 2020 • DOI: https://doi.org/10.1016/j.cell.2020.07.030

- The third compartment appears
- A and B compartments are mixed
- Epigenetic modifications restrain malignization

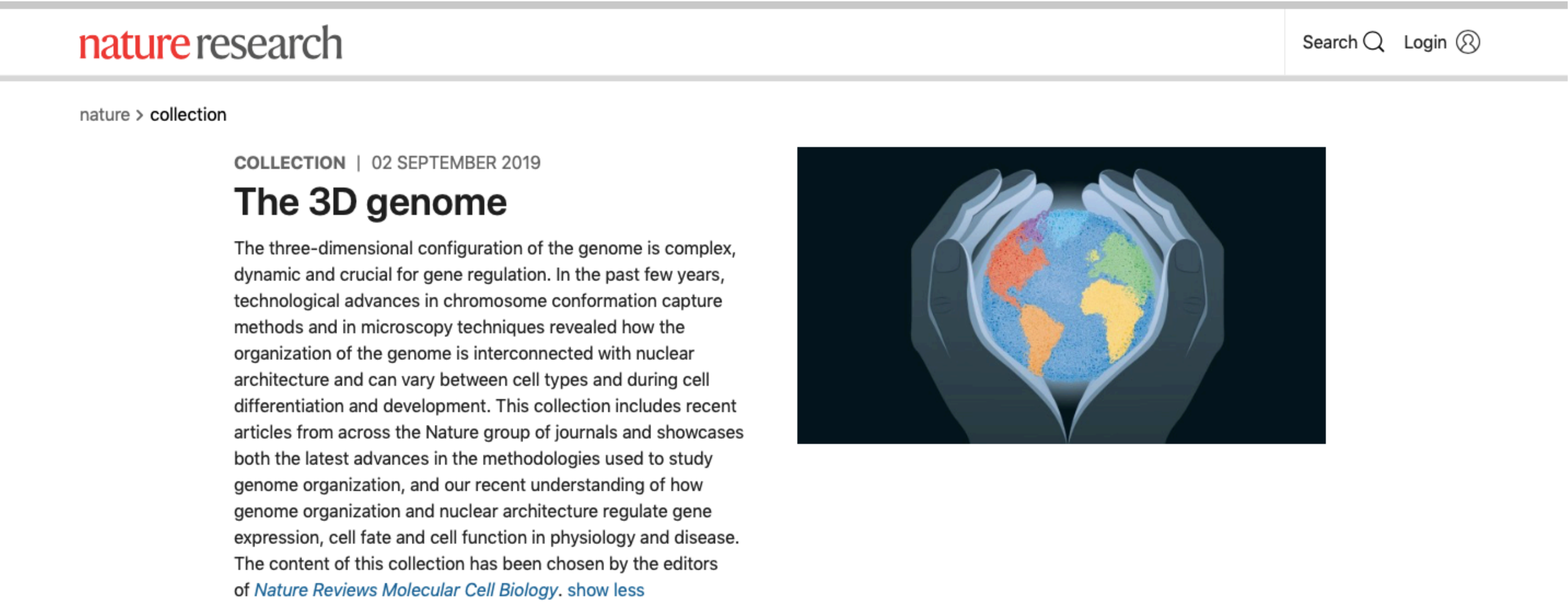
1. A and B compartments are “mixed” in the nuclei of tumour cells

2. The third “I” compartment appears: characterised by hypomethylation and polycomb H3K27me3 modification— this hypomethylation restrains oncogenes

3. Similar shifts were evident in non-malignant cells that have accumulated excess divisions



3. For more 3D-genomics insights I recommend The 3D genome Nature collection



COLLECTION | 02 SEPTEMBER 2019

The 3D genome

The three-dimensional configuration of the genome is complex, dynamic and crucial for gene regulation. In the past few years, technological advances in chromosome conformation capture methods and in microscopy techniques revealed how the organization of the genome is interconnected with nuclear architecture and can vary between cell types and during cell differentiation and development. This collection includes recent articles from across the Nature group of journals and showcases both the latest advances in the methodologies used to study genome organization, and our recent understanding of how genome organization and nuclear architecture regulate gene expression, cell fate and cell function in physiology and disease. The content of this collection has been chosen by the editors of *Nature Reviews Molecular Cell Biology*. show less

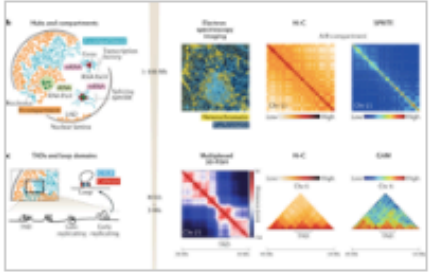
Reviews

REVIEW ARTICLE
17 DEC 2019
Nature Reviews Genetics

Methods for mapping 3D chromosome architecture

How chromosomes are positioned and folded within the nucleus has implications for gene regulation. In this Review, Kempfer and Pombo describe and evaluate methods for studying chromosome architecture and outline the insights they are providing about nuclear organization.

Rieke Kempfer & Ana Pombo

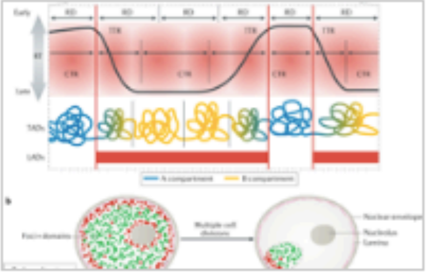


REVIEW ARTICLE
2 SEP 2019
Nature Reviews Molecular Cell Biology

Control of DNA replication timing in the 3D genome

Different genomic regions are replicated at different times during the S phase of the cell cycle, forming early- and late-replicating domains that occupy different locations in the nucleus. The recent identification of specific DNA sequences and long non-coding RNAs... show more

Claire Marchal, Jiao Sima & David M. Gilbert

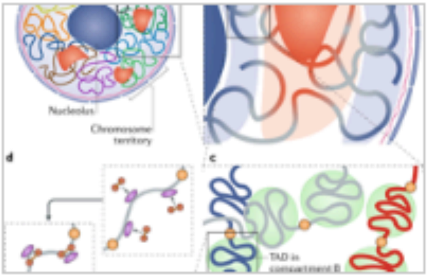


REVIEW ARTICLE
13 JUN 2019
Nature Reviews Molecular Cell Biology

The role of 3D genome organization in development and cell differentiation

The 3D organization of the genome is crucial for gametogenesis, embryogenesis and cell differentiation through its modulation of transcription, DNA replication and cell division. Recent studies have highlighted the roles of 3D chromatin dynamics, such as the... show more

Hui Zheng & Wei Xie



REVIEW ARTICLE
13 MAY 2019
Nature Reviews Genetics

Long-range enhancer–promoter contacts in gene expression control

For appropriate control of gene expression, enhancers must communicate with the right target genes at the right time, typically over large genomic distances. In this Review, Schoenfelder and Fraser discuss our latest understanding of long-range enhancer–promoter... show more

Stefan Schoenfelder & Peter Fraser