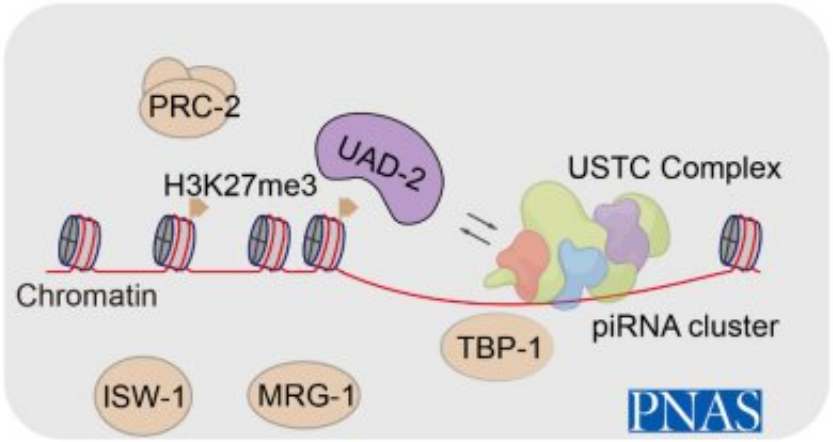
Researchers find new protein conducting piRNA expression

July 15 2021



A working model of UAD-2-directed piRNA expression. Credit: HUANG Xinya et al.

PIWI-interacting RNAs (piRNAs), a class of conserved non-coding small RNAs, are essential for sex determination, defense against viruses, maintaining genome integrity of diverse animal species. However, many piRNA clusters reside within or close to the heterochromatin, a transcriptional silencing loci. How piRNAs are transcribed remains unknown.

Facing this problem, Prof. Guang Shouhong and research fellow Feng Xuezhu from University of Science and Technology of China of the Chinese Academy of Sciences (CAS) identified a chromodomain-

containing protein, UAD-2, in the model organism Caenorhabditis elegans (C. elegans), and determined the role of UAD-2 in the regulation of gene transcription in heterochromatin regions. This work was published on *Proceedings of the National Academy of Sciences* of the United States of America (PNAS) on July 6.

In 2019, Prof. Guang and international collaborators discovered the upstream sequence transcription complex (USTC) and specified its role in the biogenesis process of piRNAs in Genes & Development. Using the USTC complex as a tool, researchers isolated a USTC association-dependent mutant, or uad-2 for short, in which the piRNA foci were depleted, by clonal screening.

Following experiments confirmed that the uad-2 genome was essential for the genesis of piRNAs. In addition, the researchers found that the UAD-2 protein and the USTC complex colocalized with each other in the nucleus, and they were mutually dependent on each other for the proper localization. Thus, the UAD-2 was required in the production of piRNAs by this mutual effect with the USTC complex.

Many piRNA loci overlap with a heterochromatin mark histone called H3K27me3 in C. elegans. The chromodomain in the UAD-2 is one of the major readers of the histone mark, and exogenous experiments proved that the H3K27me3 promoted UAD-2 and USTC focus assembly. Proper modification of H3K27me3 was also recognized as important.

Findings of this work provide a brand-new way for further studies of the transcription of piRNA in heterochromatin region.

More information: Xinya Huang et al, A chromodomain protein mediates heterochromatin-directed piRNA expression, *Proceedings of the National Academy of Sciences* (2021). DOI:

10.1073/pnas.2103723118

Provided by University of Science and Technology of China

Citation: Researchers find new protein conducting piRNA expression (2021, July 15) retrieved 26 April 2024 from https://phys.org/news/2021-07-protein-pirna.html

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.