



中国科学院生物物理研究所

贝时璋讲座

Co-dependent assembly of piRNA precursor complexes and piRNA cluster heterochromatin

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报告人简介

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【报告摘要】 The piRNA pathway silences transposons and maintains germline genome integrity, but it is unclear how piRNA precursors are differentiated from gene transcripts. *Drosophila* germline piRNA precursors are produced from the unspliced transcripts of heterochromatic clusters marked by the HP1 homolog Rhino. UAP56 is a general RNA export and processing factor, but UAP56 colocalizes with Rhino, binds cluster transcripts, and the *uap56sz* allele specifically blocks piRNA biogenesis and increases cluster transcript splicing. We show that this allele disrupts UAP56 binding to the THO subcomplex of the Transcription and Export (TREX) complex, and that THO binds to unspliced cluster transcripts and to pre-mRNAs. By contrast, UAP56 associates with cluster transcripts, but does not associate with pre-mRNAs. Mutations in the *thoc7* component of the THO subcomplex increase cluster transcript splicing, block piRNA production, and disrupt Rhino binding to cluster heterochromatin. Mutations in *rhino* disrupt UAP56 association with cluster transcripts, but do not alter THO binding to these transcripts. Rhino thus promotes assembly of mature piRNA precursor complexes that contain both UAP56 and THO, and this complex suppress piRNA precursor splicing and promotes Rhino binding to cluster heterochromatin.

研究成果:

1. Zhuang, J., Wang, J., Theurkauf, W.E., Z. Weng. (2014). A computational method for analyzing transposable element polymorphism in populations. *NAR*, Accepted.
2. Zhang, Z., Wang, J., Schultz, N., Zhang, F., Prahad, S., Tu, S., Vreven, T., Weng, Z., and W.E. Theurkauf (2014). The HP1 homolog Rhino anchors a nuclear complex that suppresses piRNA precursor splicing. *Cell* 157, 1353-1363.
3. Perrat, P. N., DasGupta, S., Wang, J., Shang, Y., Theurkauf, W. E., Weng, Z., Rosbash, M., and Scott Waddell (2013). Transposition driven genomic heterogeneity in the *Drosophila* brain. *Science* 340, 91-95.
4. Zhang, F, Wang, J., Xu, J., Zhang, Z., Koppetsch, B., Schultz, N., Vreven, T., Meignin, C., Davis, I., Zamore, P. D., Weng, Z. and W. E. Theurkauf (2012). UAP56 couples piRNA clusters to the perinuclear transposon silencing machinery. *Cell* 151, 871-884.
5. Khurana, J. S., Wang, J., Xu, J., Koppetsch, B., Thomson, T., Nowosielska, A., Li, C., Zamore, P. D., Weng, Z., and W. E. Theurkauf (2011). Adaptation to *P* element transposon invasion in *Drosophila melanogaster*. *Cell* 147, 1551-1563.