



Antonin Morillon

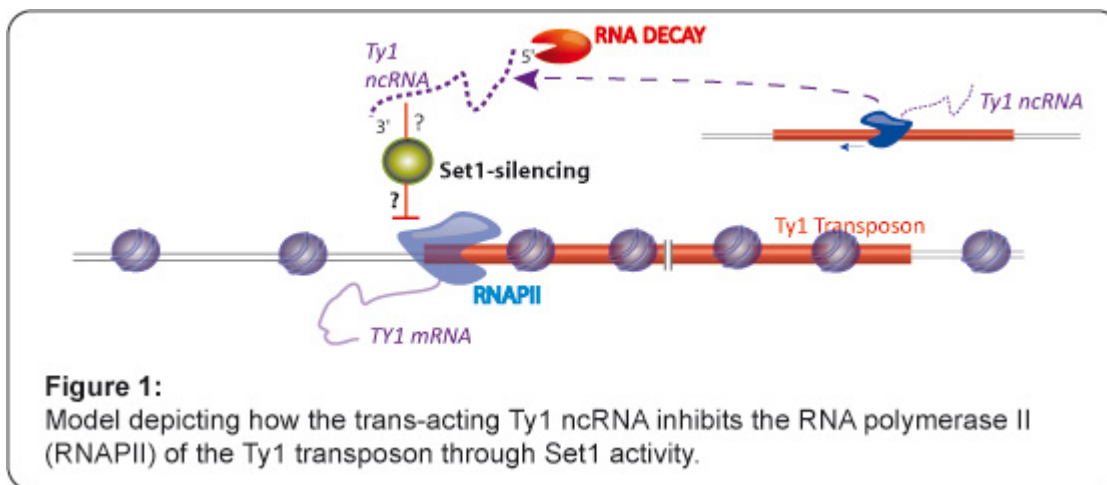
Non-coding RNA, epigenetics and genome fluidity

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**Our research interest is focused on non coding (nc)RNAs, representing the “dark matter” of the genome. In eukaryotes, ncRNAs have been shown to regulate gene expression, chromatin domains and genome stability. A growing number of evidence suggests that they play central roles on cancer development and cellular differentiation. Regulatory ncRNA can be classified in two categories depending on their size.**

Short interfering (si)RNAs, also known to be part of the RNA interference pathway, have been extensively studied and control gene expression and chromosome segregation. Large (l)ncRNAs participate also in gene silencing and are key players in cell differentiation and development but, in contrast to siRNAs, their mode(s) of action remain poorly characterized. Our lab was one of the first to describe lncRNA-mediated epigenetic regulation controlling transposon proliferation and gene expression in the budding yeast providing powerful genetic and large scale tools to uncover their regulatory mechanisms in this classic model organism.



Since the beginning of our research project in 2005, we obtained two main results showing the existence of a trans-acting ncRNA controlling the Ty1 transposon in yeast (Figure 1). In addition, we provided evidence that cryptic transcription mediates the deposition of histone marks controlling inducible genes. Finally using RNA-seq technology, we recently defined an entire family of antisense regulatory ncRNA in yeast, that we called XUTs (Figure 2).

Our work shows that yeast is indeed an excellent organism to study regulatory ncRNA that are involved in chromatin regulation. Interestingly, the processing and the mode of action of the yeast large ncRNA implicate pathways important for genome integrity and cell development in mammalian cells, suggesting that their mechanisms might be conserved among the eukaryotic kingdom.

Our future aims are to extensively identify all the regulatory ncRNA in yeast and to further characterize their associated proteins to understand the mechanisms controlling histone modifications both at the euchromatin and heterochromatin domains. Our ongoing work will set up the fundamental basis for future studies in higher eukaryotes, especially during differentiation and cancer.

## Key publications

### Year of publication 2019

(2019 Nov 15)

#### **Reference-free transcriptome exploration reveals novel RNAs for prostate cancer diagnosis.**

*Life Sci Alliance* : [DOI : 10.26508/lsa.201900449](https://doi.org/10.26508/lsa.201900449)

Ugo Szachnowski, Sara Andus, Dominika Foretek, Antonin Morillon, Maxime Wery (2019 Aug 30)

**Endogenous RNAi pathway evolutionarily shapes the destiny of the antisense lncRNAs transcriptome.**

*Life science alliance* : [DOI : e201900407](https://doi.org/10.1093/life/liaa047)

(2019 May 1)

**Long non-coding RNAs: towards urinary diagnosis for prostate cancer**

*Bulletin de l'Académie Nationale de Médecine* : [DOI : https://doi.org/10.1016/j.banm.2018.03.001](https://doi.org/10.1016/j.banm.2018.03.001)

Aria Ronsmans, Maxime Wery, Ugo Szachnowski, Camille Gautier, Marc Describes, Evelyne Dubois, Antonin Morillon, Isabelle Georis (2019 Mar 1)

**Transcription-dependent spreading of the Dal80 yeast GATA factor across the body of highly expressed genes.**

*PLoS genetics* : e1007999 : [DOI : 10.1371/journal.pgen.1007999](https://doi.org/10.1371/journal.pgen.1007999)

Bingning Xie, Emmanuelle Becker, Igor Stuparevic, Maxime Wery, Ugo Szachnowski, Antonin Morillon, Michael Primig (2019 Feb 15)

**The anti-cancer drug 5-fluorouracil affects cell cycle regulators and potential regulatory long non-coding RNAs in yeast.**

*RNA biology* : 1-15 : [DOI : 10.1080/15476286.2019.1581596](https://doi.org/10.1080/15476286.2019.1581596)

Pinskaya M., Saci Z., Gallopin M., Nguyen N.H., Gabriel M., Firlej V., Describes M., de la Taille A., Londoño-Vallejo A., Allory Y., Gautheret D., Morillon A. (2019 Jan 1)

**Blind exploration of the unreferenced transcriptome reveals novel RNAs for prostate cancer diagnosis**

*bioRxiv* : [DOI : 10.1101/644104](https://doi.org/10.1101/644104)