

# SIROCCO

Silencing RNAs: organizers and coordinators of complexity in eukaryotic organisms

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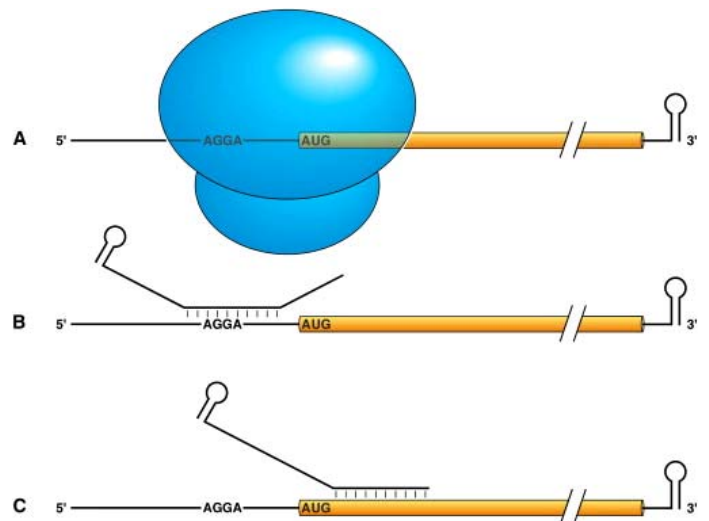
## sRNA Binding to mRNA Coding Region in Bacteria

SIROCCO Partner Jörg Vogel has shown in two recent papers that bacterial sRNAs have at least two mechanisms to repress target mRNAs. Small noncoding RNAs have predominantly been shown to repress bacterial mRNAs by masking the Shine-Dalgarno (SD) or AUG start codon sequence, thereby preventing 30S ribosome entry and, consequently, translation initiation. In the first paper, Jörg and his colleagues show that *Salmonella* RybB sRNA represses *ompN* mRNA translation by pairing with the 5' coding region. The translational repression is achieved by sequestering sequences within the mRNA down to the fifth codon thereby preventing 30S ribosome entry. This "five codon window" for translational control in the 5' coding region of mRNA not only has implications for sRNA target predictions but might also apply to cis-regulatory systems such as RNA thermosensors and riboswitches.

Small RNA binding to 5' mRNA coding region inhibits translational initiation. Bouvier M, Sharma CM, Mika F, Nierhaus KH, Vogel J. *Mol Cell*. 2008 Dec 26;32(6):827-37.

In a subsequent paper, Jörg and his co-authors demonstrate that Hfq associated MicC sRNA silences *Salmonella typhimurium ompD* mRNA via a 12-bp RNA duplex within the coding sequence (codons 23–26) that is essential and sufficient for repression. MicC does not inhibit translational initiation at this downstream position but instead acts by accelerating RNase E-dependent *ompD* mRNA decay. The authors propose an alternative gene-silencing pathway within bacterial mRNA coding sequence wherein sRNAs repress targets by endonucleolytic mRNA destabilization rather than by the prototypical inhibition of translational initiation. This is the first example of an sRNA that inactivates its

target by exclusive recognition within the coding sequence and downstream of translational initiation. Coding sequence targeting by MicC RNA reveals bacterial mRNA silencing downstream of translational initiation. Pfeiffer V, Papenfort K, Lucchini S, Hinton JC, Vogel J. *Nat Struct Mol Biol*. 2009 Aug;16(8):840-6. Epub 2009 Jul 20.



Translational Repression by Bacterial sRNAs(A) Ribosome binding in the absence of an sRNA. The 30S and 50S ribosomal subunits (blue ovoids) bind to an mRNA segment comprising portions of the 5' untranslated region (black line) and coding region (amber cylinder), including the SD (AGGA) and the start codon (AUG).(B) Inhibition of ribosome binding by an sRNA (bent black line) base paired to the SD.(C) Inhibition of ribosome binding by an sRNA base paired downstream of the start codon and within the five codon window.

From a review of Bouvier et al by Richards and Belasco *Mol Cell*. 2008 Dec 26;32(6):751-3.



## RESEARCH SPOTLIGHT



[A hairpin RNA construct residing in an intron efficiently triggered RNA-directed DNA methylation in tobacco.](#)

Dalakouras A, Moser M, Zwiebel M, Krczal G, Hell R, Wassenegger M.

Plant J. 2009 Aug 21. [Epub ahead of print]

[Small RNA binding to 5' mRNA coding region inhibits translational initiation.](#)

Bouvier M, Sharma CM, Mika F, Nierhaus KH, Vogel J. Mol Cell. 2008 Dec 26;32(6):827-37.

[Coding sequence targeting by MicC RNA reveals bacterial mRNA silencing downstream of translational initiation.](#)

Pfeiffer V, Papenfort K, Lucchini S, Hinton JC, Vogel J. Nat Struct Mol Biol. 2009 Aug;16(8):840-6. Epub 2009 Jul 20.

[Design and evaluation of a panel of single-nucleotide polymorphisms in microRNA genomic regions for association studies in human disease.](#)

Muñoz-Gimeno M, Montfort M, Bayés M, Estivill X, Espinosa-Parrilla Y.

Eur J Hum Genet. 2009 Oct 7. [Epub ahead of print]

[Repertoire and evolution of miRNA genes in four divergent nematode species.](#)

de Wit E, Linsen SE, Cuppen E, Berezikov E. Genome Res. 2009 Sep 15. [Epub ahead of print]

[Directed Gene Silencing with Artificial MicroRNAs.](#)

Schwab R, Ossowski S, Warthmann N, Weigel D. Methods Mol Biol. 2010;592:71-88.

[CDE-1 affects chromosome segregation through uridylation of CSR-1-bound siRNAs.](#) van Wolfswinkel JC, Claycomb JM, Batista PJ, Mello CC, Berezikov E, Ketting RF.

Cell. 2009 Oct 2;139(1):135-48.

Wellcome Trust Conference Centre



### *SIROCCO 2009 16-18 November*

90 delegates are now registered for the third SIROCCO Annual Meeting to be held at the Wellcome Trust Conference Centre in Hinxton UK <http://www.wtconference.org>  
 Proceedings start at 14.00 on Monday 16th November  
 Keep sending in your poster abstracts—there will be a prize!

Shuttle bus schedule has been changed slightly to accommodate later flights.

From Stansted Airport to Hinxton:

Sunday 15th November 18.00/ 19.30/ 21.00/ 23.00

Monday 16th November 09.00/ 10.00/11.00/ 12.30

From Hinxton to Stansted Airport:

Wednesday 18th November 14.00/ 15.00/ 16.00/ 17.00

On exiting the terminal, follow the signs for buses.

The coach will be marked Richmond's and will be parked in a bay beside the public buses.



### COMPETITIVE CALL

SIROCCO Competitive Call 2 for new partners is now on—deadline 12th November

Details are on the home page of the project website [www.sirocco-project.eu](http://www.sirocco-project.eu)