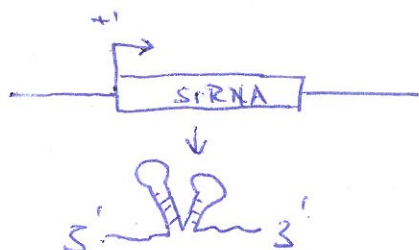


5. POSTTRANSCRIPTIONAL GENE REGULATION

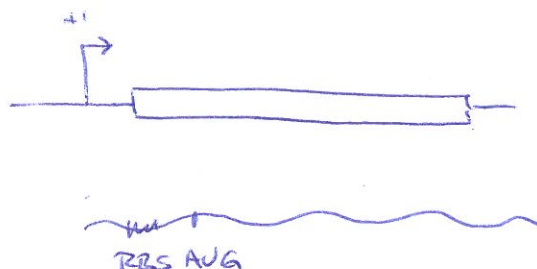
5.1 REGULATORY RNAs IN BACTERIA:

~~cis~~ TRANS-ENCODED BASE PAIRING RNAs

SRNA :



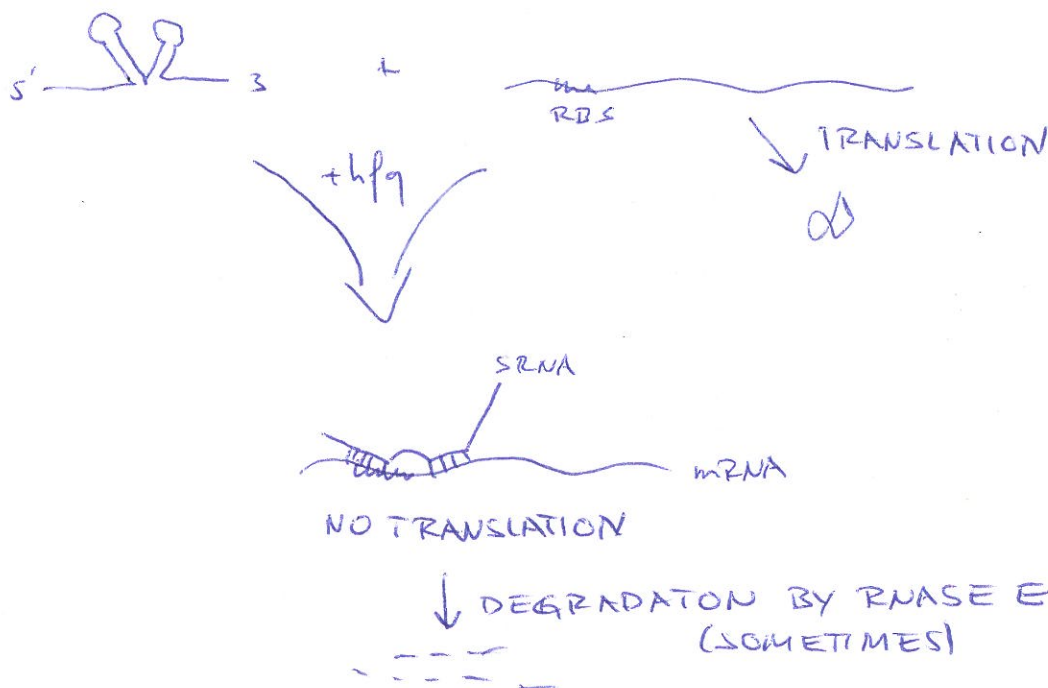
TARGET mRNA



- NON-CODING
- TYPICALLY 50-250nt
- HAVE SECONDARY STRUCTURE

INTERACTION BETWEEN SRNA AND TARGET

- IMPERFECT BASE PAIRING
 - BIND TO 5' UTR
 - TYPICALLY REQUIRES hfq (RNA-BINDING CHAPERONE PROTEIN)
 - OFTEN INVOLVED IN STRESS RESPONSE
- ~~part~~
- INHIBITION



EXAMPLE:

micF SRNA \rightarrow OmpF

micC SRNA \rightarrow OmpC

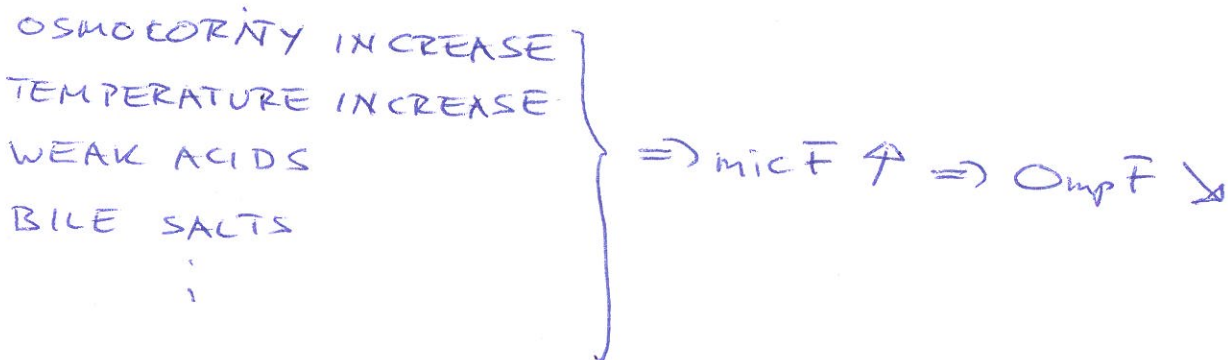
OmpF, OmpC: PORINS, OUTER MEMBRANE PROTEINS IN E-COLI

OmpF: LARGER, PORE DIAMETER

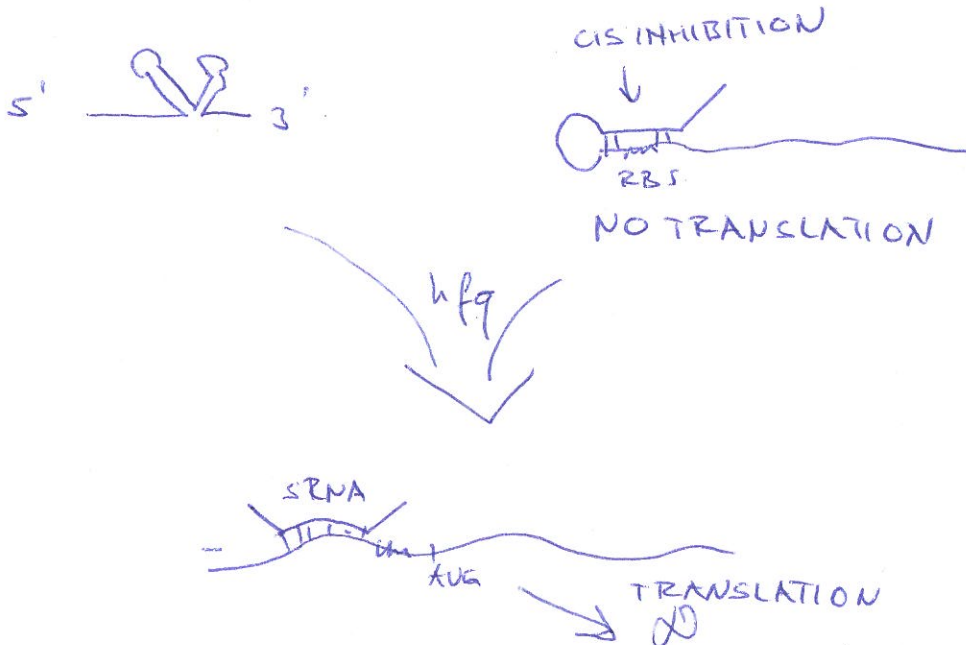
IMPORTANT WHEN TOXIN AND NUTRIENT CONC. ARE LOW,
(WATER) LOW TEMP.

OmpC: SMALLER PORE DIAMETER

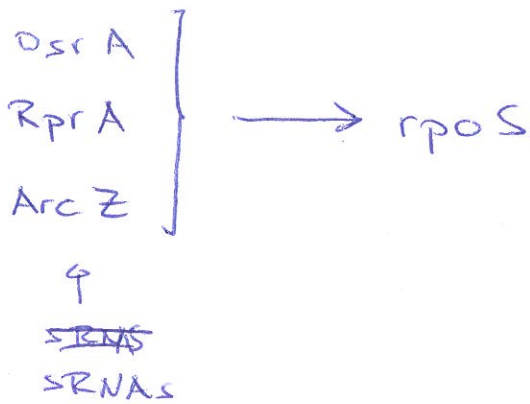
IMPORTANT WHEN TOXIN AND NUTRIENT CONC ARE HIGH
HIGH TEMP (INTESTINE)



ACTIVATION



EXAMPLE:



rpo S: ENCODES σ^S SUBUNIT OF RNA POLYMERASE
TRANSCRIPTION FACTOR FOR STRESS RESPONSE GENES

WHY REGULATORY RNA (INSTEAD OF PROTEINS)?

- (i) THEY ARE SHORT AND LESS COSTLY TO MAKE
- (ii) REGULATION CAN BE FAST (SHORT, NO TRANSLATION)
- (iii) IMPERFECT BASE PAIRING: MULTIPLE TARGETS, EVOLVABLE?
- (iv) THRESHOLD LINEAR RESPONSE (MODEL)
- (v) MOST IMPORTANT FOR SYN BIO: WATSON-CRICK ~~BT~~ PAIRING IS PREDICTIBLE!

EXAMPLE: SYNTHETIC ACTIVATING SMALL RNA

(ISAACS, FJ ETAL NATURE BIOTECHNOLOGY 22, 841 (2004))

