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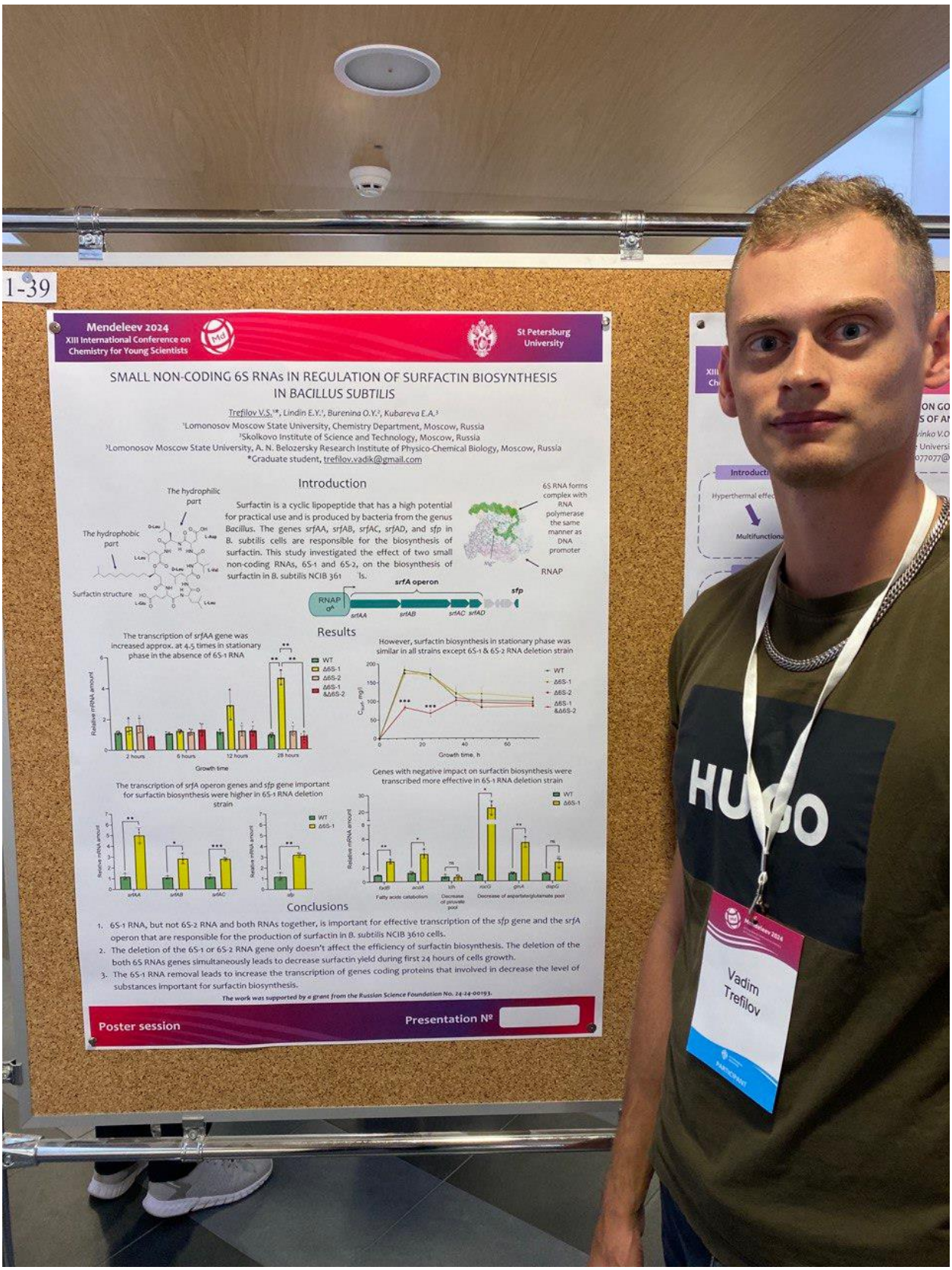
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SMALL NON-CODING 6S RNAs IN REGULATION OF SURFACTIN BIOSYNTHESIS IN BACILLUS SUBTILIS
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Introduction
The hydrophilic part
The hydrophobic part
Surfactin structure
Surfactin is a cyclic lipopeptide that has a high potential for practical use and is produced by bacteria from the genus Bacillus. The genes srfAA, srfAB, srfAC, srfAD, and sfp in B. subtilis cells are responsible for the biosynthesis of surfactin. This study investigated the effect of two small non-coding RNAs, 6S-1 and 6S-2, on the biosynthesis of surfactin in B. subtilis NCIB 361 ls.
6S RNA forms complex with RNA polymerase the same manner as DNA promoter
RNAP
srfA operon
sfp
RNAP σA
srfAA
srfAB
srfAC srfAD
Results
The transcription of srfAA gene was increased approx. at 4.5 times in stationary phase in the absence of 6S-1 RNA
Relative mRNA amount
2 hours
6 hours
12 hours
28 hours
Growth time
WT
Δ6S-1
Δ6S-2
Δ6S-1 &Δ6S-2
However, surfactin biosynthesis in stationary phase was similar in all strains except 6S-1 & 6S-2 RNA deletion strain
Growth time, h
The transcription of srfA operon genes and sfp gene important for surfactin biosynthesis were higher in 6S-1 RNA deletion strain
srfAA
srfAB
srfAC
sfp
Genes with negative impact on surfactin biosynthesis were transcribed more effective in 6S-1 RNA deletion strain
fadB
acsA
lph
mpnG
gltA
dapG
Fatty acids catabolism
Decrease of pyruvate pool
Decrease of aspartate/glutamate pool
Conclusions
1. 6S-1 RNA, but not 6S-2 RNA and both RNAs together, is important for effective transcription of the sfp gene and the srfA operon that are responsible for the production of surfactin in B. subtilis NCIB 3610 cells.
2. The deletion of the 6S-1 or 6S-2 RNA gene only doesn't affect the efficiency of surfactin biosynthesis. The deletion of the both 6S RNAs genes simultaneously leads to decrease surfactin yield during first 24 hours of cells growth.
3. The 6S-1 RNA removal leads to increase the transcription of genes coding proteins that involved in decrease the level of substances important for surfactin biosynthesis.
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Poster session
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