

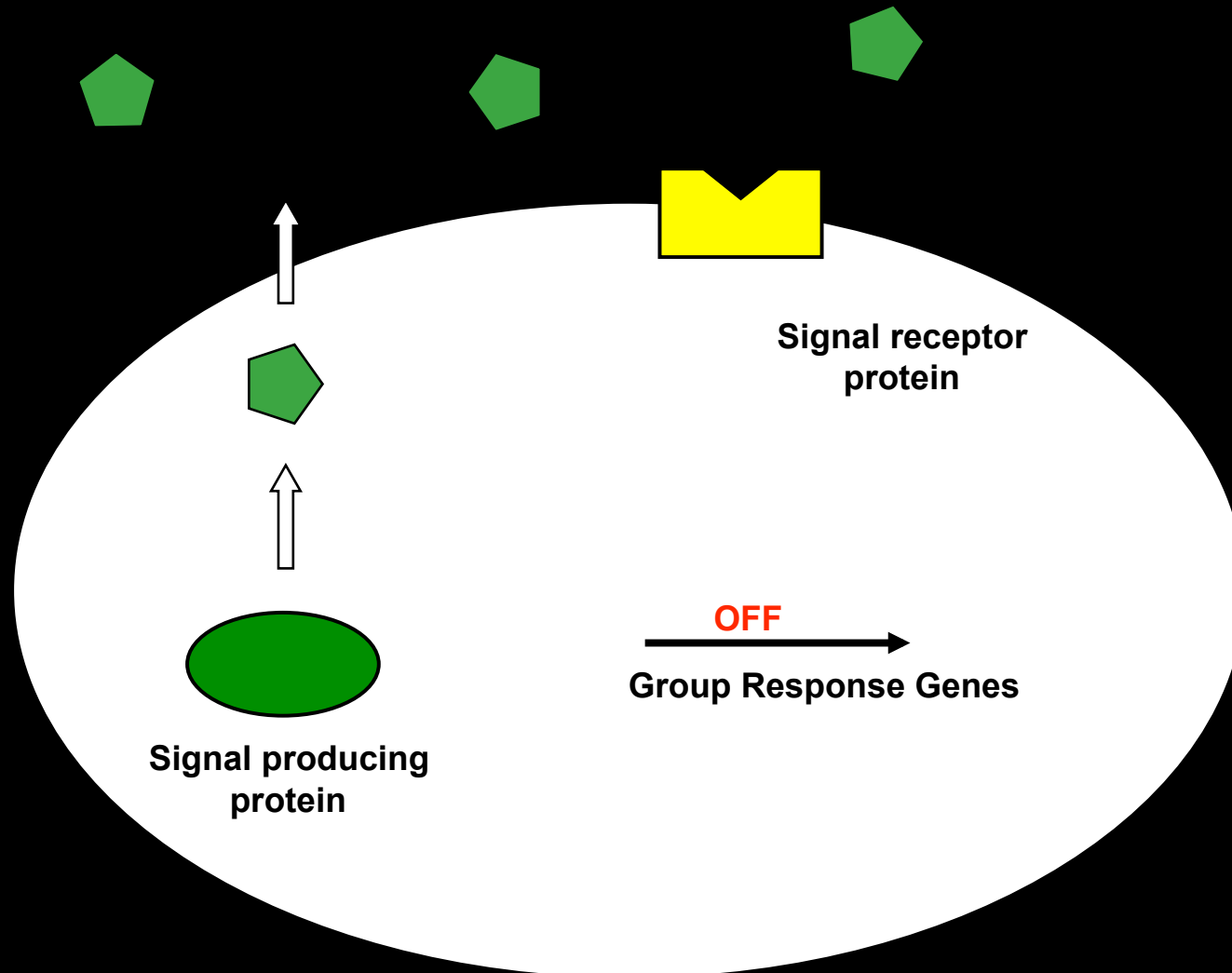
Eavesdropping on the conversations of an environmental pathogen

A person wearing a white lab coat and a white face mask is holding a petri dish. The person is looking down at the petri dish. The background is dark and out of focus.

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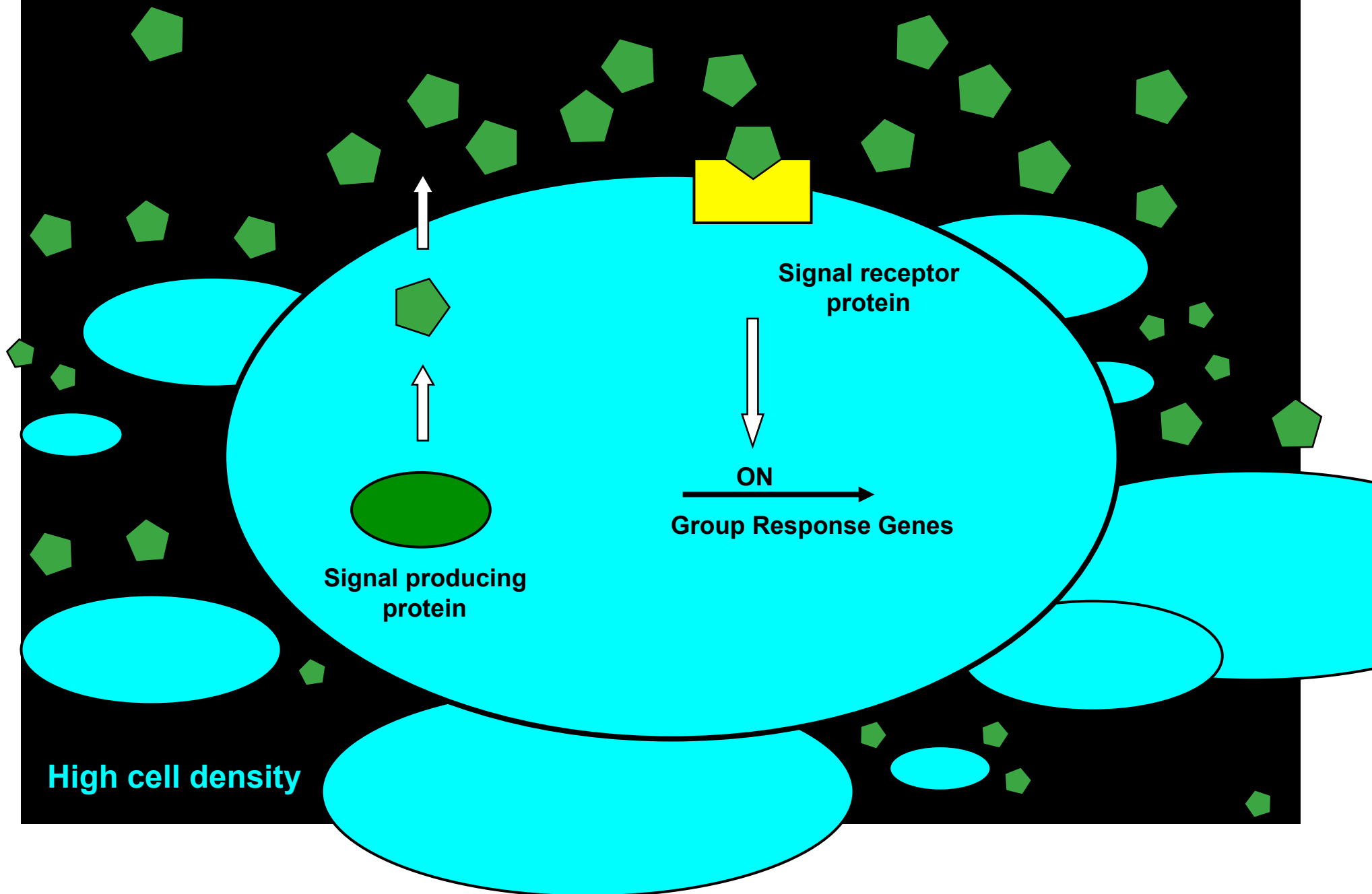


Quorum sensing



Low cell density

Quorum sensing



High cell density

Bacterial quorum sensing is ubiquitous

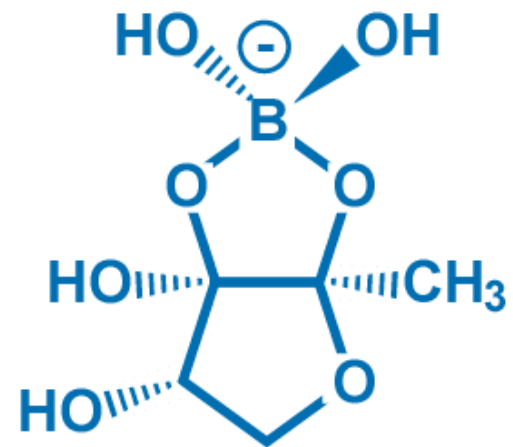
<i>Actinobacillus actinomycetemcomitans</i>	Periodontal virulence, Mixed-species biofilms
<i>Bacillus anthracis</i>	Growth
<i>Bacillus cereus</i>	Biofilms
<i>Bacillus subtilis</i>	Development
<i>Borrelia burgdorferi</i>	Virulence
<i>Campylobacter jejuni</i>	Motility, Toxins
<i>Clostridium difficile</i>	Virulence, Toxins
<i>Clostridium perfringens</i>	Virulence, Toxins
<i>Escherichia coli</i> K12	AI-2 transport, Biofilms, Cell division, DNA processing, Iron uptake
<i>Escherichia coli</i> EHEC O157:H7	Virulence, Type III Secretion, Motility
<i>Escherichia coli</i> EPEC	Motility, Type III Secretion
<i>Vibrio harveyi</i>	Bioluminescence, Biofilms
<i>Haemophilus influenzae</i>	Virulence, Cell invasion
<i>Helicobacter pylori</i>	Motility, Biofilms
<i>Klebsiella pneumoniae</i>	Biofilms
<i>Lactobacillus reuteri</i>	Biofilms in mice
<i>Listeria monocytogenes</i>	Biofilms
<i>Mannheimia haemolytica</i>	Virulence, Encapsulation, Adhesion
<i>Neisseria meningitidis</i>	Virulence, Bacteremia
<i>Photobacterium luminescens</i>	Antibiotic production
<i>Porphyromonas gingivalis</i>	Virulence, Proteases Hemin acquisition, Stress response
<i>Salmonella typhi</i>	Biofilms
<i>Salmonella typhimurium</i>	AI-2 transport, Biofilms
<i>Serratia marcescens</i>	Virulence in <i>C. elegans</i> , Hemolysin, Antibiotic production
<i>Shigella flexneri</i>	VirB (virulence factor)
<i>Staphylococcus epidermidis</i>	Virulence, Biofilms
<i>Streptococcus gordonii</i>	Mixed-species biofilms
<i>Streptococcus mutans</i>	Virulence, Biofilms, Competence, Stress response
<i>Streptococcus pneumoniae</i>	Virulence, Persistence, Competence
<i>Streptococcus pyogenes</i>	Virulence factors, Protease, Hemolysin
<i>Vibrio anguillarum</i>	Protease
<i>Vibrio cholerae</i>	Virulence, Toxins, Biofilms
<i>Vibrio fischeri</i>	Bioluminescence, Colonization
<i>Vibrio harveyi</i>	Bioluminescence, Biofilms, Siderophore, Virulence, Type III Secretion

Bilingual bacteria

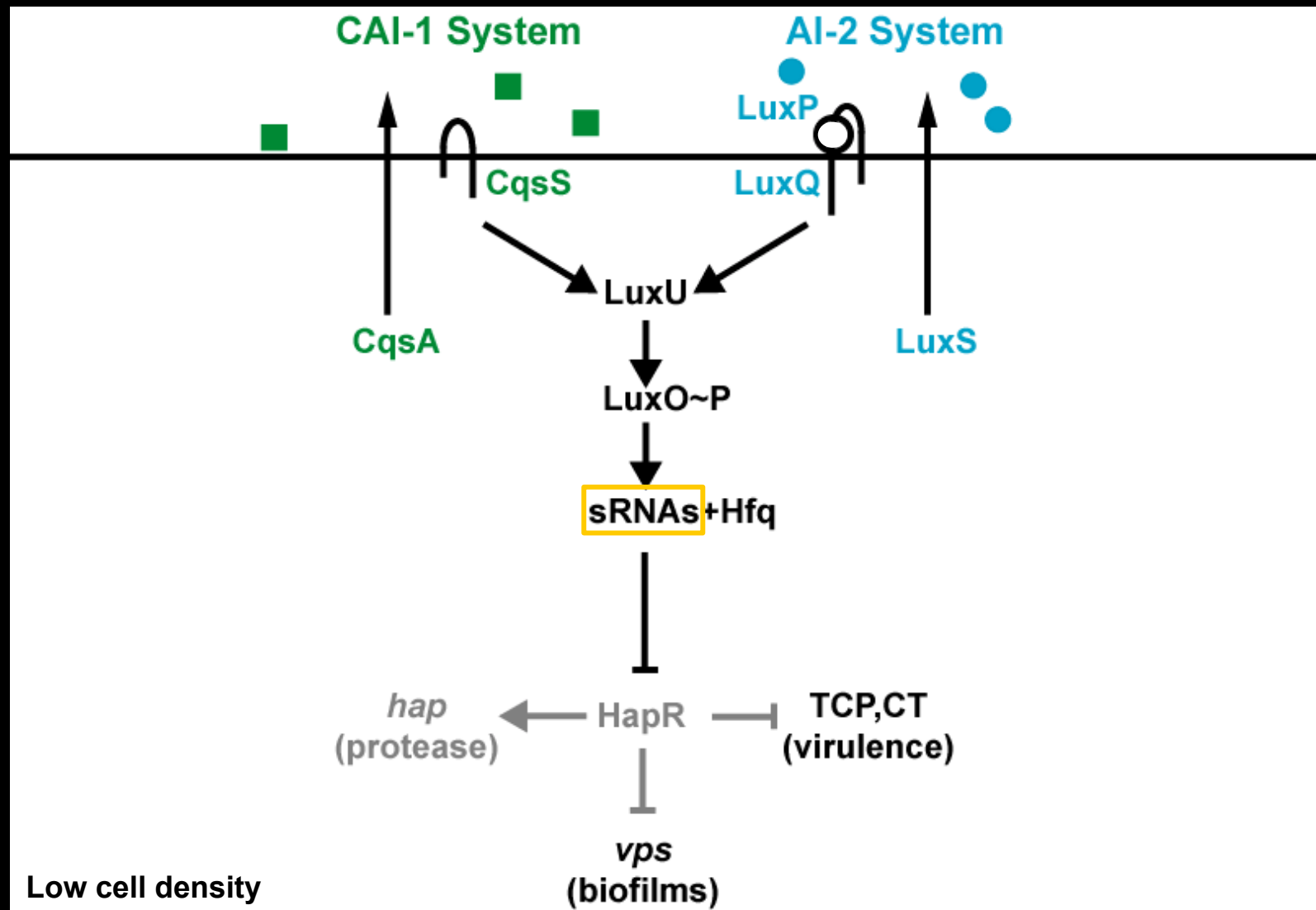
AI-1



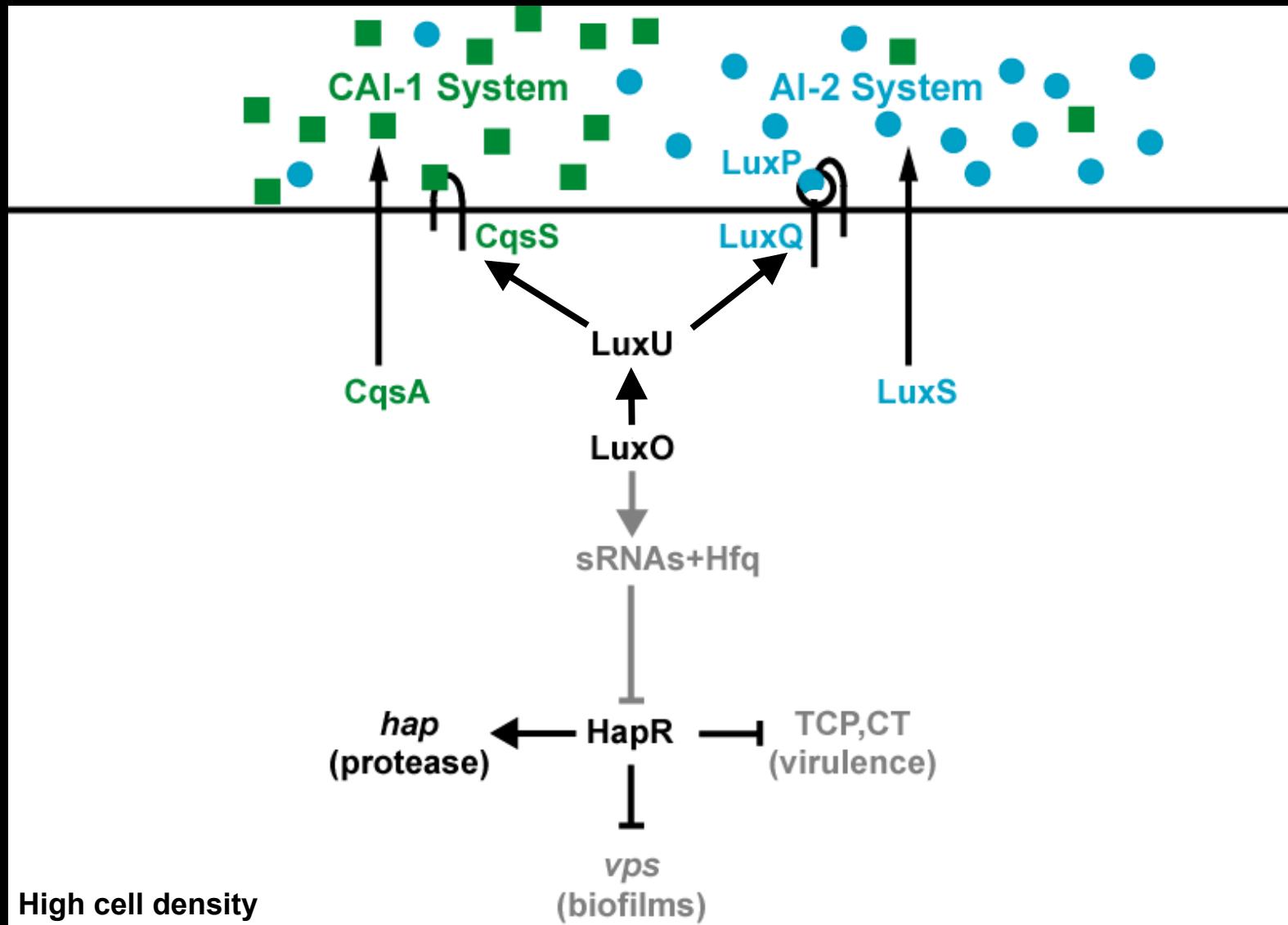
AI-2



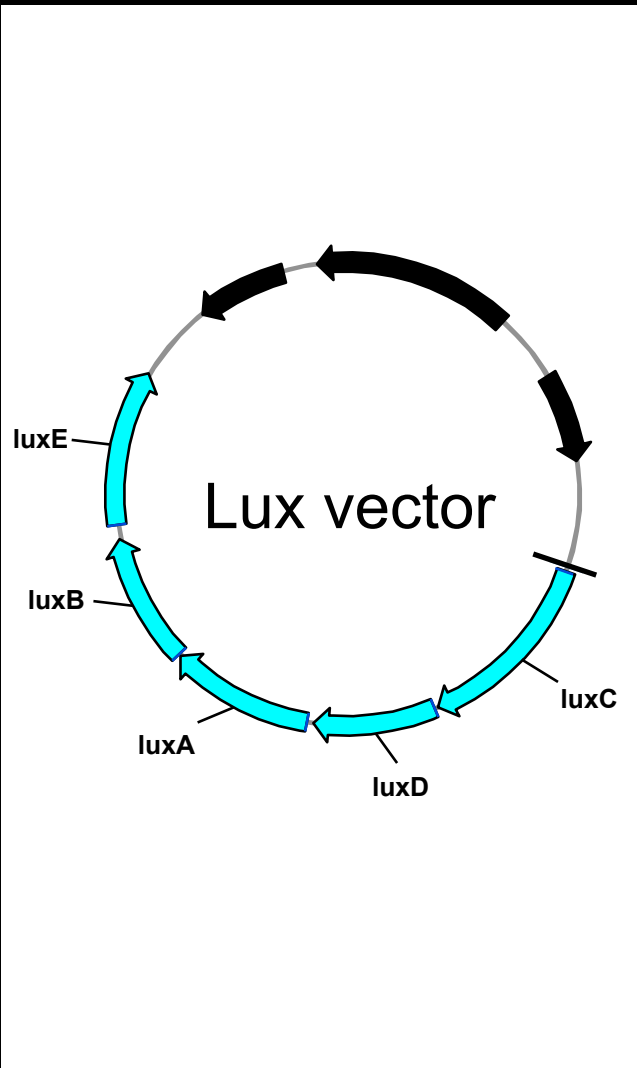
In *Vibrio cholerae*, virulence factors and biofilms are expressed when small RNAs are made



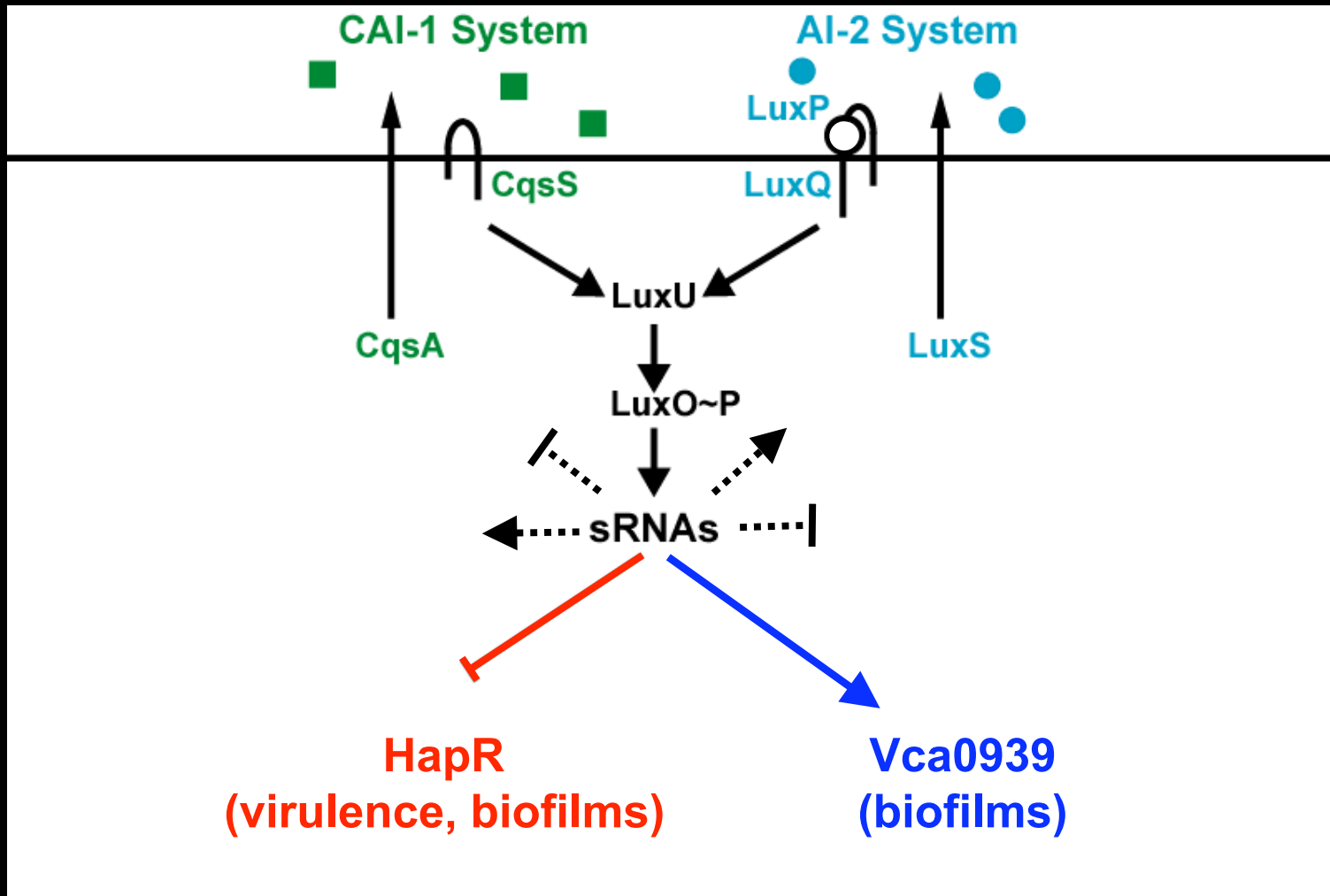
**In *Vibrio cholerae*,
virulence and biofilms are repressed
when small RNAs are absent**



Screening a Lux-transcriptional library reveals a new sRNA-controlled target gene



New sRNA pathways in *V. cholerae*



How sRNAs repress targets (ex: *hapR*)

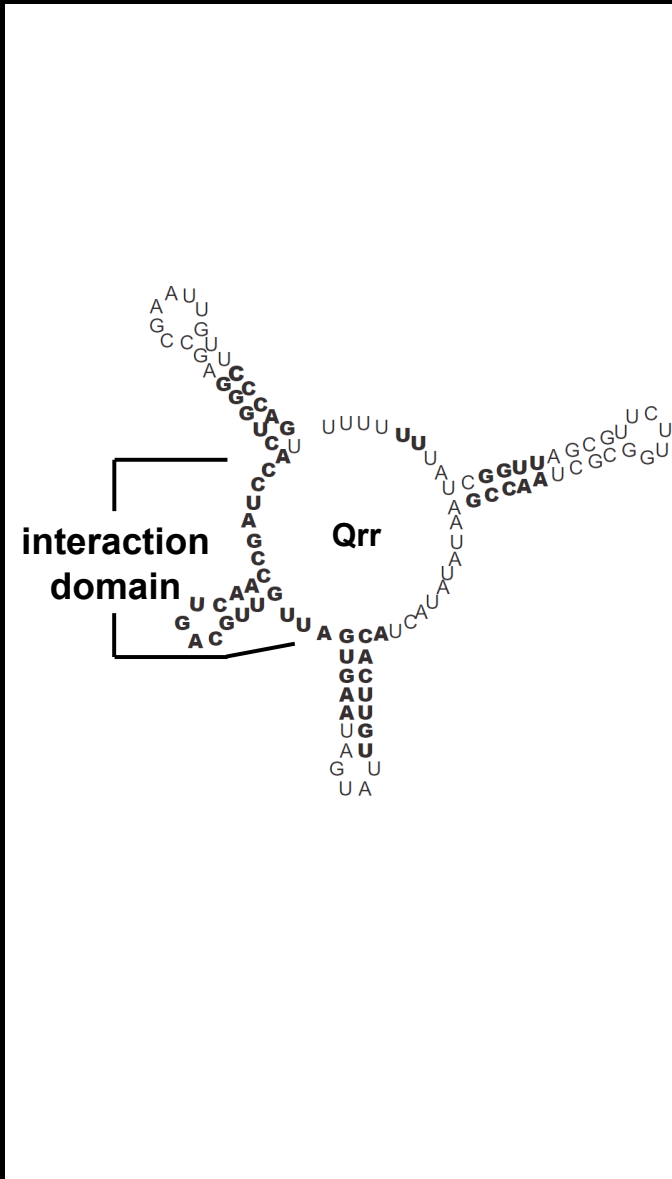


Degradation of
hapR mRNA
no HapR protein



HapR protein

Bioinformatics corroborates transcriptional profiling



Quorum sensing and small regulatory RNAs

Molecular and Cell Biology

What target genes are controlled by base pairing with the QS sRNAs?

Computational Biology and Bioinformatics

What are the structural and sequence requirements for sRNA/mRNA base pairing?

Ecology, Evolution and Behavior

What is role of quorum sensing in the environment and in the human host?



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