

Vibrio Campbellii Quorum Sensing

Abstract

This study will demonstrate the use of the ATCC *Vibrio campbellii* Panel (ATCC® MP-6™) as a non-pathogenic model for AI-2-based quorum sensing pathways.

Introduction

In many prokaryotes, cooperative behaviors are regulated through a density-dependent, signal-mediated communication system termed quorum sensing (QS).¹ When a bacterial population reaches a critical threshold, autoinducer signaling molecules (AI) specifically bind to a cognate regulatory protein or activate a two-component signal transduction system, leading to the regulation of group behaviors. In the marine organism *Vibrio campbellii*, AI signals (AI-1 and AI-2) and cognate regulators are used to regulate bioluminescence¹ (Figure 1). Since its discovery, AI-2 has proven ubiquitous within inter- and intraspecies communication, including that of pathogenic microorganisms.² Here, we show a panel of nine *V. campbellii* strains displaying wild-type or varying mutational phenotypes for use as a non-pathogenic model in the analysis of AI-2-based QS systems.

Materials and Methods

Nine *V. campbellii* strains were phenotypically analyzed for QS proficiency by monitoring the bioluminescence production of genotypically diverse strains that were plated together in pairs on Autoinducer Bioassay Medium.^{1,3-6}

Results and Discussion

Upon analysis of paired strains, it was determined that bioluminescence could be restored in strains lacking regulator and/or AI production if the adjacent strain was proficient in that characteristic (Figure 2A-C, Table 1). Bioluminescence could not be restored in strains lacking part of the luxCDABE operon, which encodes for bioluminescence (Figure 1, Figure 2D, Table 1).

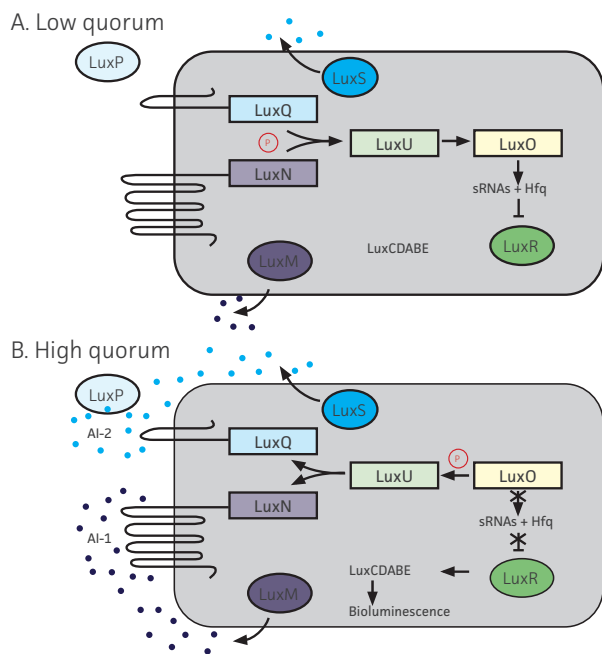


FIGURE 1. Quorum sensing

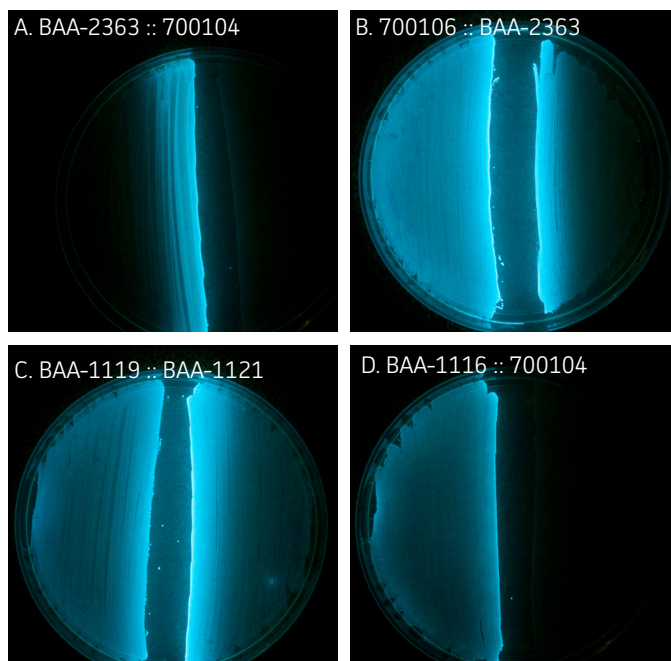


FIGURE 2. Bioluminescence

TABLE 1. ATCC® *Vibrio campbellii* Panel (MP-6™)

Sensors	Autoinducers									
		1+, 2+	1+, 2+	1+, 2+	1+, 2+	1+, 2+	1-, 2+	1+, 2-	1+, 2-	1-, 2-
	ATCC® No.	700104™	700106™	BAA-1116™	BAA-1117™	BAA-1118™	BAA-1119™	BAA-1120™	BAA-1121™	BAA-2363™
luxA-	700104™	-	-	-	-	-	-	-	-	-
1+, 2-	700106™	+	+	+	+	+	+	+	+	+
1+, 2+	BAA-1116™	+	+	+	+	+	+	+	+	+
1-, 2+	BAA-1117™	+	+	+	+	+	+	+	+	+
1+, 2-	BAA-1118™	+	+	+	+	+	+	+	+	+
1-, 2+	BAA-1119™	+	+	+	+	+	+	+	+	+
1+, 2+	BAA-1120™	+	+	+	+	+	+	+	+	+
1-, 2+	BAA-1121™	+	+	+	+	+	+	-	-	-
1+, 2+	BAA-2363™	+	+	+	+	+	-	-	-	-

Sensor 1 = LuxN; Sensor 2 = LuxQ; Autoinducer 1 = AI-1; Autoinducer 1 AI-2; (+) = Light observed; (-) = No Light observed

Conclusion

The characterization of these *V. campbellii* strains illustrates that ATCC® MP-6™ is well suited as a non-pathogenic model for the analysis of AI-2-based, two-component regulatory QS pathways.

References

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