

#### 1 Supplemental Information Appendix 1: Figures and Legends

2 Supplemental Figure 1: C-di-GMP and IPTG Do Not Significantly Alter Cell Length or Width 3 in WT or *AvpsL* Backgrounds. Distributions of cell length (A, C) and width (B,D) as a function 4 of IPTG concentration in populations grown to early stationary phase (OD<sub>600</sub> = 1.3) expressing 5 inactive DGC (QrgB\*, light) or active DGC (QrgB, dark). Panels A and B are the  $\Delta vpsL$  strain 6 expressing  $QrgB^*$  or QrgB while panels C and D are the WT and  $\Delta vpsL$  backgrounds with no 7 vector. The box represents the first, second, and third quartiles. The dot represents the mean. 8 Each distribution represents between 1,000 and 1,200 cells analyzed and pooled from two to 9 three separate experiments. Insert) Estimated effects of QrgB expression and IPTG on the 10 population medians for each morphological parameter. (dot = mean, thick line = 90% CI, thin line 11 = 98% CI).



Supplementary Figure 2: Length and Width Measurements from VpsR and VpsR
Complementation. Length (A) and width (B) measurements from the same cells as Figure 2.
Insert) Estimated effects of QrgB expression and IPTG on the population median for each
morphological parameter. (dot = mean, thick line = 90% CI, thin line = 98% CI).



- 18 Supplementary Figure 3: VpsT Overexpression in the D12 V. cholerae E7946 DGC Mutant.
- 19 VpsT (grey) and the empty vector (pEMPTY, white) was overexpressed in the WT E7946 strain
- 20 and D12 E7946 V. cholerae mutant and curvature (A), length (B), and width (C) were measured.
- 21 Violin plots represent the distributions from three biological replicates, boxplots show 25th, 50th,
- 22 and 75th percentile, and dots represent the mean.
- 23
- 24





26 Supplemental Figure 4: Complementation of *AcrvA* Restores Curvature. *Plasmid* 27 **Complementation.** Distributions of cell curvature (A), length (B), and width (C) from  $\Delta crvA$  strains 28 complemented with the control vector (pHERD20C) or CrvA (pCrvA) expressing an inactive DGC 29 (QrgB\*, light) or active DGC (QrgB, dark) in early stationary phase (OD<sub>600</sub>=1.3) populations 30 supplemented with 100 µM. Chromosomal Integration Complementation. Distributions of cell 31 curvature, length, and width of either parent,  $\Delta crvA$ , and  $\Delta crvA$  complemented with a single copy 32 of CrvA driven by its native promoter integrated at the VC1807 locus (\(\triangle crvA VC1807::pcrvA-crvA)\) 33 harboring QrgB\* (light) or QrgB (dark). Cultures were grown to early stationary phase (OD<sub>600</sub> = 34 1.3) in the presence of 100 µM IPTG. Inserts) Estimated effects of QrgB expression and crvA on 35 the population median for each morphological parameter. (dot = mean, thick line = 90% CI, thin 36 line = 98% CI).



38 Supplemental Figure 5: Cell Shape Parameters for WT and CrvA-HIS backgrounds.

- 39 Curvature (A), length (B), and width (C) were measured in WT and CrvA-HIS backgrounds.
- 40 Cultures were grown to early stationary phase ( $OD_{600} \sim 1.3$ ) and imaged by phase microscopy.
- 41 Insert) Estimated differences in the population medians of each morphological parameters
- 42 between mutant strains. (dot = mean, thick line = 90% CI, thin line = 98% CI).
- 43



- 44 Supplemental Figure 6: Cell Shape Curvature of Surface Attached and Planktonic Cells.
- 45 Curvature of in the planktonic phase or cells attached to the surface (Microcolony) was
- 46 measured for the WT strain at 8 hours following the conditions described for Fig. 5. Violin plots
- 47 represent the curvature distributions for two to three replicates, boxplots represent 25th, 50th,
- 48 and 75th percentiles, and dots represent the mean curvature.



### 50 Supplemental Figure 7: Effect of Curvature on Surface Coverage. Total fluorescence

51 intensities from stained cells (FM4-64) attached to a glass surface for different strains. Each dot

52 represents one field of view. Dot shapes represents independent replicates. Insert) Estimate of

- the differences in the means explained by *crvA* and pCrvA (dot = mean, thick line = 90% CI, thin
- 54 line = 98% CI).



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57 Supplemental Figure 8: WT, Straight, and Curved Populations Have Indistinguishable 58 Growth Rates. Each shape represents an independent trial with six biological replicates. Insert) 59 Estimate of the differences in the means between WT-pHERD20C and  $\Delta crvA$ -pCrvA, WT-60 pHERD20C and  $\Delta crvA$ -pHERD20C, and  $\Delta crvA$ -pHERD20C and  $\Delta crvA$ -pCrvA (dot = mean, thick 61 line = 00% CL this line = 00% CL)

61 line = 90% CI, thin line = 98% CI).



63 Supplemental Figure 9: Cell shape Parameters of WT and △crvA (crvA) cells. Curvature

(A), length (B), and width (C) measurements of cells grown to early stationary phase in M9
 pyruvate. Insert) Estimated effect of crvA deletion on populations medians for each

66 morphological parameter. (dot = mean, thick line = 90% CI, thin line = 98% CI).

#### Supplemental Information Appendix 2: Strains, Plasmids, and Oligonucleotides

## 71 Supplemental Table 1: Strains Used in this Study

Strain	Description	Reference		
Escherichia coli				
S17-λpir	Tpr Smr <i>recA thi pro hsdR17</i> (r <sub>K</sub> ⁻m <sub>K</sub> ⁺) <i>RP4::2-Tc</i> ::Mu Km	Lab stock		
	Tn7 λpir			
Vibrio cholerae				
C6706	Wild Type	Lab Stock		
CW2034	C6706∆vpsL	(11)		
JC1195	CW2034∆vpsT	(14)		
WN310	CW2034∆vpsR	(14)		
NF6	CW2034∆crvA	This study		
NF7	ΔcrvA	This study		
NF8	CW2034∆crvA VC1807::P <sub>crvA</sub> -crvA	This study		
NF9	CW2034 crvA::crvA-HIS	This study		
E7946 Sm <sup>R</sup>	Wild Type	(30)		
∆12DGC	ΔVCA0956, ΔVC1599, ΔVC2454, ΔVC1104, ΔVCA0939, ΔVCA0074,			
	ΔVC2224, ΔVC1376, ΔVC1067, ΔVC1216, ΔVCA0697, ΔVC2285, Ptac- (30)			
	<i>tfoX ΔrecJ</i> 501bp, <i>ΔexoVII</i> 501bp, <i>ΔlacZ</i> :: <i>laclq</i> , ΔVC1807::Tm <sup>R</sup>			

Plasmid	Description	Reference
pBBRlux	<i>luxABCDE</i> containing promoter-less plasmid, Cam <sup>R</sup>	Lab collection
pEVS143	<i>pTac</i> overexpression vector, Kan <sup>R</sup>	(66)
pKAS32	Sucide vector for mutant construction, Amp <sup>R</sup>	(53)
pBRP333	Control expression vector, Kan <sup>R</sup>	(20)
pBRP1	<i>qrgB</i> * (inactive DGC) cloned into expression vector pMMB67Eh, Amp <sup>R</sup>	(20)
pBRP2	<i>qrgB</i> (active DGC) cloned into expression vector, pMMB67Eh, Amp <sup>R</sup>	(20)
pCMW131	<i>vpsR</i> in pEVS143, Kan <sup>R</sup>	(23)
pCMW132	<i>vpsT</i> in pEVS143, Kan <sup>R</sup>	(23)
pHERD20T	P <sub>BAD</sub> Expression vector	(67)
pNF057	pHERD20T <sub>p</sub> BAD expression vector with Cam <sup>R</sup> replacing Amp <sup>R</sup>	(24)
pNF069	358 bp upstream of ATG of <i>crvA</i> ( <i>P</i> <sub>crvA</sub> ) in pBBRlux	This study
pNF070	Deletion construct for <i>crvA</i> in pKAS32, Amp <sup>R</sup>	This study
pNF071	VC1807 knock-in construct, Amp <sup>R</sup>	This study
pNF072	VC1807 knock-In construct with CrvA driven by native promoter $P_{crvA}$ , Amp <sup>R</sup>	This study
pNF073 (pCrvA)	CrvA from C6706 gDNA into pNF057	This study

# 74 Supplemental Table 2: Plasmids Used in this Study

Vector Construction           pNF069_For <sup>1</sup> cggtggcggcgctctagaa         GGTATCTCAAATTGCTTCAAAAC           pNF069_Rev <sup>2</sup> ccattttgcggccgcaactagag         AAAGTGGGAAAGACAAAC           pNF070_US_For <sup>3</sup> tgcgcatgctatgtt         CAGTAGTAGCGGATCATC           pNF070_DS_For <sup>3</sup> ttccacttt         CCGCACAAAAATCCAACG           pNF070_DS_For <sup>3</sup> ttccacttt         CCGCACAAAATCCAACG           pNF070_DS_For         ttccacttt         CCGCACAAAAATCCAACG           pNF071_US_For         ttggggaggct         TAGTCACACTATTGTAACTGG           pNF071_US_For         ttccacttt         TAGTCACATATAAAAAAACACG           pNF071_DS_For         ttccacttt         TAGTCACAATAAAAAAACACG           pNF071_DS_For         ttccacttt         CGATGAGGATAAAAAACAC           pNF071_DS_For         gtggagtcccgggaggct         CGATGCTGTTTGTTAGTGG           pNF072_For         gacatagagtgcacaggta         CTAGCTGTTTGTTGGCTGA           pNF072_Rev         cgcatgctaccggtac         CTAGCTGTCTTGTTGGTCGG           pNF073_Rev         ttcgaggagcccaggaggct         ACGCAAAAATACAAAAACAC           pNF074_DS_For         tcagaccaacaagagcgccatcaccaccaccaccaccaccaccaccaccaccaccac	Oligo Name	5' Overhang	Gene Specific
pNF069_For1cggtgggggcgctetagaaGGTATCTCAAATGCTTCAAACpNF069_Rev2ccattttggggcgcaactagagAAAGTGGGAAAGACAAACpNF070_US_For2tucgggCAGTAGTAGCGGATCATCpNF070_DS_For2tuctgggCGGCACAAAAATCCAACGpNF070_DS_For3tuccactttCGGCACAAAAATCCAACGpNF070_DS_For3tucgggagagagtTGGTGAAGCTGACTTTTGpNF071_US_For3tuttgtcggTGGTGAACTCAATGGCTAACpNF071_DS_For4tuttgtcggTAGTCGAAATAAAAAAAGAGGpNF071_DS_For5tuccactttTAGTCGAAATAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	Vector Construc	ction	
pNF069_Rev2ccattttgcggccgaactagagAAAGTGGGAAAGACAAACpNF070_US_For3tgcgcatgctatagttCAGTAGTAGCGGATCATCpNF070_US_RevttttgtcggAAAGTGGGAAAGACAAACpNF070_DS_For4ttcccctttCCGCACAAAAATCCAACGpNF070_DS_RevgtggaattcccgggagagctTGGTGAAGCTGACTTTTGpNF071_US_FortgcgcatgctatagttATTTTCAGTTGGCCTACpNF071_US_RevttttgtcggTAGTCAACCTCATTGTTAACTGGpNF071_DS_RevgtggaattcccgggagagctCGATGAGGATAAAAAAAAGAGGpNF071_DS_RevgtggaattcccgggagagctCGATGAGGATAAAAAAAAAAAGAGGpNF071_DS_RevgtggaattcccgggagagctCGATGGCGATAAAAAAAAAACACpNF072_RevcgactagagctcaccggtacCTAGCTGTCTTGTTGGpNF073_RevtctgagagatcccgggtacCTAGCTGTCTTGTTGGTCGpNF074_US_FortctgagagtccccgggtacCTAGCTGACAAAATCAAAATCAAACpNF074_DS_FortctgaggatcccgggtacCTAGCTGTCTTGTTGGTCGpNF074_US_FortctgaggatcccgggtacTAGCGGAAAAAACCAAAATCCAACpNF074_DS_FortctgaccaacaaagacgccatcaccatcaccatcTAGCCGCACAAAAATCCAACpNF074_DS_FortctgaccaacaaagacgccatcaccatcaccatcaTAGCCGCACAAAAATCCAACpNF074_DS_FortctgactaccgggaggtGCGATGTTTGTTGGTCGGAGCgyrA-For-AAATTCACTCTCATGGCAACgyrA-For-AAATTCACCCGTTGAACCGATTGTAGGTrvA-RevCCGTAATCACACGATTGTAGGT'For = Forward'Arew enverseCCGTAATCACACGATTGTAGGT'Arew enverseCCGTAATCACACGATTGTAGGT	pNF069_For <sup>1</sup>	cggtggcggccgctctagaa	GGTATCTCAAATTGCTTCAAAAC
pNF070_US_For3tgggatggtagttaggttaggttCAGTAGTAGCGGATCATCpNF070_US_RevttttgtggggAAAGTGGGAAAGACAAACpNF070_DS_For4ttccactttCCGCACAAAATCCAACGpNF070_DS_RevgtggattcccgggagagctTGGTGAAGCTGACTTTTGpNF071_US_Fortgggattgggggggggggggggggggggggggggggg	pNF069_Rev <sup>2</sup>	ccattttgcggccgcaactagag	AAAGTGGGAAAGACAAAC
pNF070_US_RevttttgtgcggAAAGTGGGAAAGACAAACpNF070_DS_For4ttcccactttCCGCACAAAAATCCAACGpNF070_DS_RevgtggaattcccgggagagctTGGTGAAGCTGACTTTTGpNF071_US_FortgcgcatgctagctatagttATTTTTCAGTTGGCCTACpNF071_US_RevttttgtgcggTAGTCGAAAATAAAAAAAAAAAAAAGAGGpNF071_DS_RevgtggaattcccgggagagctCGATGAGGATAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	pNF070_US_For <sup>3</sup>	tgcgcatgctagctatagtt	CAGTAGTAGCGGATCATC
pNF070_DS_For4         ttcccacttt         CCGCACAAAAATCCAACG           pNF070_DS_Rev         gtggaattcccgggagggct         TGGTGAAGCTGACTTTTG           pNF071_US_For         tgcgcatgctaggtaggt         ATTTTCAGTTGGCCTAC           pNF071_US_Rev         tttdtgcgg         TAGTCACACTCATTGTAACTGG           pNF071_DS_For         ttcccacttt         TAGTCGAAAATAAAAAAAAAAAAAAAAAAAAAAAAAAAA	pNF070_US_Rev	ttttgtgcgg	AAAGTGGGAAAGACAAAC
pNF070_DS_RevgtggaattecegggagagetTGGTGAAGCTGACTTTTGpNF071_US_ForteggeatgetagetatagettATTTTCAGTTGGCCTACpNF071_US_RevtttttggggTAGTCACCTCTATTGTTAACTGGpNF071_DS_ForteccactttTAGTCGAAAATAAAAAAAAAAAAAAAAAAAAAAAAAAAA	pNF070_DS_For4	ttcccacttt	CCGCACAAAAATCCAACG
pNF071_US_FortgcgcatgctagctatagttATTTTCAGTTGGCCTACpNF071_US_RevttttgtgcggTAGTCAAAATAAAAAAAAGAGGpNF071_DS_ForttcccactttTAGTCGAAAATAAAAAAAAAGAGGpNF071_DS_RevgtggaattcccgggaaggtCGATGAGGATAAAAAAAACACpNF072_RevcgactagagtcaccggtacCTAGCTGTCTTTGTTTGGpNF073_ForatctgataagaattcgagctATGTGGCTAAACTAAAAAAATGTGTGpNF073_RevtctagaggtccccgggtacCTAGCTGTCTTTGTTTGGpNF074_US_FortctgataagaattcgagctATCGATGAGAAATTGAGTAACpNF074_US_FortctgacccaggtacCTAGCTGCTTTGTTTGGTCTGpNF074_DS_RevtctgaccaacaagacagccatcaccatcaGCGAACAGTACCAAAATCCAACpNF074_US_FortctgaccaacaaagacagccatcaccatcaccatcaGCGAAACAGTACTGCGAGpNF074_DS_RevgtggaattcccgggaaggtGCGAAACAGTACTGCGAACpNF074_DS_RevtagacccaagagaaggctGCGAAACAGTACTGCGAGpNF074_DS_RevitggaattcccgggaaggtGCGAAACAGTACTGCGAACpNF074_DS_RevitggaattcccgggaaggtGCGAAACAGTACTGCGAACgyrA-For-AAATTCATCTCACAGGATGTAGCAACgyrA-For-CCGTAATCACACGATTGTAGGTATcrvA-Rev-CCGTAATCACACGATTGTAGGTA*rev = ReverseStattagaagaattagaagaagaagaagaagaagaagaaga	pNF070_DS_Rev	gtggaattcccgggagagct	TGGTGAAGCTGACTTTTTG
pNF071_US_Rev         ttttgtgcgg         TAGTCACCTCTATTGTTAACTTG           pNF071_DS_For         tcccacttt         TAGTCGAAAATAAAAAAAGAGG           pNF071_DS_Rev         gtggaattcccgggagggct         CGATGAGGATAAAAAAAAAGAGG           pNF072_For         acaatagaggtgactaggta         GGTATCTCAAATTGCTTCAAAAC           pNF072_Rev         cgactagagctcaccggtac         CTAGCTGTCTTTGTTTGG           pNF073_For         atctgataagaattcgagct         ATGTGGCTAAACATAAATATGTTG           pNF073_Rev         tctagaggatccccgggtac         CTAGCTGTCTTGTTTGG           pNF074_US_For         tgcgcatgctatggta         GCTGTCTTTGTTGGTCTG           pNF074_US_Rev         cagaccaaacaaggacgccatcaccactaccactacca         GCGAAACAGTACTGCGAAG           pNF074_US_Rev         tdgggaattccggggaggt         GCGAAACAGTACTGCGAAG           pNF074_DS_For         tgggaattccgggaggct         GCGAAACAGTACTGCGAAG           pNF074_DS_Rev         gtggaattccgggaggt         GCGAAACAGTACTGCGAAC           gyrA-For         -         GCGAACAGTACTCGCAAC           gyrA-For         -         GCGTATCCCGTTGAACCGATGTAGGT           rvA-For         -         GCGTATCACACGATTGTAGGT           rvA-For         -         GCGTATCCCGTTGAACTCGTATT           rvA-For         -         CCGTAATCACACGATTGTAGGT           rvA-Fror	pNF071_US_For	tgcgcatgctagctatagtt	ATTTTTCAGTTGGCCTAC
pNF071_DS_ForttcccactttTAGTCGAAAATAAAAAAAGAGGpNF071_DS_RevgtggaattcccgggaagactCGATGAGGATAAAAAAACACpNF072_RevcgactagaggtgactaggtaGGTATCTCAAATTGCTTCAAAAApNF073_RevtctggaggactcaccggtacCTAGCTGTCTTGTTGGpNF073_RevtctggaggactcaccggtacCTAGCTGTCTTGTTGGpNF074_US_FortgcgcatgctatggtATCGATGAGAAATAGAAAACACApNF074_US_Rev-GCTGTCTTGTTGGTCTGpNF074_DS_RevtcggagatccccgggagactCGCAAACATAAAAATCCAACpNF074_DS_RevtcggagatcccgggagactGCGAAACAGTACTGCGAGApNF074_DS_RevtgggaattcccgggagagctGCGAAACAGTACTGCGAGApNF074_DS_RevtcggagatcccgggagagctGCGAAACAGTACTGCGAGApNF074_DS_RevtcggaattccgggagagctGCGAAACAGTACTGCGAGApNF074_DS_RevtcggaattccgggagagctGCGAAACAGTACTGCGAGApNF074_DS_RevtcggaattccgggagagctGCGAAACAGTACTGCGAGApNF074_DS_RevtcggaattccgggagagctGCGAACAGTACTGCGAGApNF074_DS_RevtcggaattccgggagagctGCGAACAGTACTGCGAGApNF074_DS_RevtcggaattccgggagagctGCGAACAGTACTGCGAGApNF074_DS_Rev-GCGAACAGTACTGCGAGApNF074_DS_Rev-GCGAACCGCGTGAACCGATGAGACpNF074_DS_Rev-GCGATGTTTCTCACAGApNF074_DS_Rev-GCGATGTTTCTCACAGACpNF074_DS_Rev-GCGATGTTTCTCACAGACprofe-GCGATGTTTCTCACAGACprofegyrA-Rev-GCGTAACCCGTTGAACTCGTTGTrVA-ForrVA-Rev <td>pNF071_US_Rev</td> <td>ttttgtgcgg</td> <td>TAGTCACCTCTATTGTTAACTTG</td>	pNF071_US_Rev	ttttgtgcgg	TAGTCACCTCTATTGTTAACTTG
pNF071_DS_RevgtggaattecegggagagetCGATGAGGATAAAAAACACpNF072_ForacatagaggtgactaggtaGGTATCTCAAATTGCTTCAAAACApNF072_RevgactagageteaceggtacCTAGCTGTCTTGTTGGpNF073_ForatctgataagaattegagetATGTGGCTAAACATAAATATGTTGpNF073_RevtetagaggateceegggtacCTAGCTGTCTTGTTGGpNF074_US_ForteggeateceegggtacGCTGTCTTGTTGGTCGGpNF074_DS_ForteggeateceeggagagetGCGAAACAGTACAGAAATCCAACApNF074_DS_ForteggeateceeggagagetGCGAAACAGTACTGCGAGApNF074_DS_ForteggaateceeggagagetGCGAAACAGTACTGCGAGApNF074_DS_ForgtggaatteegggaggetGCGAAACAGTACTGCGAGApNF074_DS_ForteggeateceeggagagetGCGAAACAGTACTGCGAGApNF074_DS_ForaftggaatteegggaggetGCGAAACAGTACTGCGAGApNF074_DS_ForaftggaatteegggaggetGCGAAACAGTACTGCGAGApNF074_DS_ForaftggaatteegggaggetGCGAAACAGTACTGCGAGApNF074_DS_ForaftggaatteegggaggetGCGAAACAGTACTGCGAGApyrA-ForaftggaatteegggaggetGCGAAACAGTACTGCGAGAgyrA-ForaftgaatteeggetGCGATGTTTCTCACAGGATGTGAGCTgyrA-RevaftggaatteeggetGCGAAACAGCAATGACACGATTGTAGGTAGArvA-ForaftgaatteeggetGCGAAACAGCACAGATGTGAGCTrvA-RevaftgetCCGTAATCACACAGATTGTAGCTrvA-RevaftgetStatteeggetrvA-RevaftgetStatteeggetrvA-RevaftgetStatteeggetrvA-RevaftgetStatteeggetrvA-RevaftgetStatteeggetrvA-Revaftget	pNF071_DS_For	ttcccacttt	TAGTCGAAAATAAAAAAAAGAGG
pNF072_ForacaatagaggtgactaggtaGGTATCTCAAATTGCTTCAAAACpNF072_RevcgactagagctcaccggtacCTAGCTGTCTTTGTTGGpNF073_ForatctgataagaattcgagctATGTGGCTAAACATAAATATGTTGpNF073_RevtctagaggatccccgggtacCTAGCTGTCTTTGTTGGpNF074_US_RevigggaattccgggaggctGCTGTCTTTGTTGGCAACpNF074_DS_RevigggaattcccgggaggctCGGAAACAGTACTGCGAGApNF074_DS_Rev-GCGAACCAGTACTGCGAGAgyrA-For-AAATTCATCTTCATGGCAACgyrA-For-GCGATGTTTTCTTCACAGcrvA-For-CCGTAATCACACGATTGTAGGTA'For = Forward'''''' Rev = Reverse-	pNF071_DS_Rev	gtggaattcccgggagagct	CGATGAGGATAAAAAACAC
pNF072_RevcgactagagctcaccggtacCTAGCTGTCTTTGTTTGGpNF073_ForatctgatagaattcgagctATGTGGCTAAACATAAATATGTTGpNF073_RevtctagaggatccccgggtacCTAGCTGTCTTTGTTTGGpNF074_US_FortgcgcatgctatgttATCGATGAGAAATTGAGTAACpNF074_DS_FortcagaaccaaagacagccatcaccatcaTAGCCGCACAAAAATCCAACpNF074_DS_RevgtggaattcccgggagagctGCGAAACAGTACTGCGAGpNF074_DS_RevgtggaattcccgggagagctGCGAAACAGTACTGCGAGpNF074_DS_Rev-AAATTCATCTTCATGGCAACgyrA-For-ACATTCATCTTCATGGCAACgyrA-For-GCGATGTTTTCTTCACAGcrvA-For-CCGTAATCACACGATTGTAGGT'For = Forward'CCGTAATCACACGATTGTAGGT'Rev = Reverse'Rev'Source = Reverse-'Source = Reverse- <tr< td=""><td>pNF072_For</td><td>acaatagaggtgactaggta</td><td>GGTATCTCAAATTGCTTCAAAAC</td></tr<>	pNF072_For	acaatagaggtgactaggta	GGTATCTCAAATTGCTTCAAAAC
pNF073_ForatctgataagaattcgagctATGTGGCTAAACATAAATATGTTGpNF073_RevtctagaggatccccgggtacCTAGCTGTCTTTGTTTGGpNF074_US_FortgcgcatgctatagttATCGATGAGAAATTGAGTAACpNF074_DS_FortcagagcacaacaaggacagcatcaccatcaccatcacTAGCCGCACAAAAAATCCAACpNF074_DS_RevgtggaattcccgggagagctGCGAAACAGTACTGCGAGgyrA-For-AAATTCATCTTCATGGCAACgyrA-Rev-GCGATGTTTTCTTCACAGcrvA-For-GCGAACCAGTACTGCGAGTATGAGGT'For = Forward'CCGTAATCACACGATTGTAGGT	pNF072_Rev	cgactagagctcaccggtac	CTAGCTGTCTTTGTTTGG
pNF073_RevtctagaggatccccgggtacCTAGCTGTCTTGTTGGpNF074_US_FortgcgcatgctatggttATCGATGAGAAATTGAGTAACpNF074_DS_ForcaggaccaaaggacggcatcaccatcaccatcaTAGCCGCACAAAAATCCAACpNF074_DS_RevgtggaattcccgggagggtGCGAAACAGTACTGCGAGgyrA-For-AAATTCATCTCATGGCAACgyrA-For-GCGATGTTTTCTTCACAGcrvA-Rev-GTACTCCCGTTGAACTCGTATT'For = Forward'CCGTAATCACACGATTGTAGGT	pNF073_For	atctgataagaattcgagct	ATGTGGCTAAACATAAATATGTTG
pNF074_US_ForticgcatgctatagttATCGATGAGAAATTGAGTAACpNF074_US_Rev-GCTGTCTTGGTCTGGpNF074_DS_FortcagaccaacaagagcagccatcaccatcaccatcacTAGCCGCACAAAAATCCAACpNF074_DS_RevgtggaattcccgggagagctGCGAAACAGTACTGCGAGAgyrA-For-AAATTCATCTTCATGGCAACgyrA-Rev-GCGATGTTTCTTCACAGcrvA-Rev-GCGTACCGTTGAACTCGTATT'For = Forward-CCGTAACACGATTGTAGGTAG	pNF073_Rev	tctagaggatccccgggtac	CTAGCTGTCTTTGTTTGG
pNF074_US_Rev-GCTGTCTTGTTGGTCTGpNF074_DS_FortcagaccaacaagaccatcaccatcacTAGCCGCACAAAAATCCAACpNF074_DS_RevgtggaattcccgggagagctGCGAAACAGTACTGCGAGgyrA-For-AAATTCATCTTCATGGCAACgyrA-Rev-GCGATGTTTCTTCACAGcrvA-For-GTACTCCCGTTGAACTCGTATTrvA-Rev-CCGTAATCACAGATTGTAGGT'For = Forward'CCGTAATCACAGATTGTAGGT	pNF074_US_For	tgcgcatgctagctatagtt	ATCGATGAGAAATTGAGTAAC
pNF074_DS_FortcagaccaaacaaagacagccatcaccatcacTAGCCGCACAAAAATCCAACpNF074_DS_RevgtggaattcccgggagagctGCGAAACAGTACTGCGAGgyrA-For-AAATTCATCTTCATGGCAACgyrA-Rev-GCGATGTTTTCTTCACAGcrvA-For-GTACTCCCGTTGAACTCGTATTcrvA-Rev-CCGTAATCACACGATTGTAGGT7 For = Forward*2 Rev = Reverse*	pNF074_US_Rev	-	GCTGTCTTTGTTTGGTCTG
pNF074_DS_RevgtggaattcccgggagagctGCGAAACAGTACTGCGAGqRT-PCRAAATTCATCTTCATGGCAACgyrA-For-AAATTCATCTTCATGGCAACgyrA-Rev-GCGATGTTTTCTTCACAGcrvA-For-GTACTCCCGTTGAACTCGTATTcrvA-Rev-CCGTAATCACACGATTGTAGGT <sup>7</sup> For = Forward- <sup>2</sup> Rev = Reverse-	pNF074_DS_For	tcagaccaaacaaagacagccatcaccatcaccatcac	TAGCCGCACAAAAATCCAAC
qRT-PCRgyrA-For-AAATTCATCTTCATGGCAACgyrA-Rev-GCGATGTTTTCTTCACAGcrvA-For-GTACTCCCGTTGAACTCGTATTcrvA-Rev-CCGTAATCACACGATTGTAGGT* Forward* Reverse	pNF074_DS_Rev	gtggaattcccgggagagct	GCGAAACAGTACTGCGAG
gyrA-For-AAATTCATCTTCATGGCAACgyrA-Rev-GCGATGTTTTCTTCACAGcrvA-For-GTACTCCCGTTGAACTCGTATTcrvA-Rev-CCGTAATCACACGATTGTAGGT <sup>1</sup> For = Forward22 Rev = Reverse2	qRT-PCR		
gyrA-Rev-GCGATGTTTCTTCACAGcrvA-For-GTACTCCCGTTGAACTCGTATTcrvA-Rev-CCGTAATCACACGATTGTAGGT <sup>1</sup> For = Forward-CCGTAATCACACGATTGTAGGT	gyrA-For	-	AAATTCATCTTCATGGCAAC
crvA-For       -       GTACTCCCGTTGAACTCGTATT         crvA-Rev       -       CCGTAATCACACGATTGTAGGT <sup>1</sup> For = Forward       -       -         2 Rev = Reverse       -       -	gyrA-Rev	-	GCGATGTTTTCTTCACAG
crvA-Rev     -     CCGTAATCACACGATTGTAGGT <sup>1</sup> For = Forward     -     - <sup>2</sup> Rev = Reverse     -     -	crvA-For	-	GTACTCCCGTTGAACTCGTATT
<sup>7</sup> For = Forward <sup>2</sup> Rev = Reverse	crvA-Rev	-	CCGTAATCACACGATTGTAGGT
<sup>2</sup> Rev = Reverse	<sup>1</sup> For = Forward		

# Supplemental Table 3: Oligonucleotides Used in this Study

<sup>4</sup> DS - Amplifies Downstream Fragment