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Microbiological Research



journal homepage: www.elsevier.com/locate/micres

Role of hypothetical protein YicS in the pathogenicity of Avian Pathogenic *Escherichia coli in vivo* and *in vitro*



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ARTICLE INFO	A B S T R A C T
<i>Keywords:</i> Hypothetical protein YicS <i>Escherichia coli</i> APEC Pathogenicity	Avian Pathogenic <i>Escherichia coli</i> (APEC) strains belong to the extra-intestinal pathogenic group of <i>E. coli</i> (ExPEC) that causes colibacillosis in poultry. A variety of putative virulence factors of APEC are recognized as potent causes of pathogenicity, the mechanisms underlying their pathogenicity are still not fully understood. The role of <i>yicS</i> in the virulence of pathogenic <i>E. coli</i> is still unclear. Thus, <i>yicS</i> may be related to biofilm formation, which in some bacteria plays a role in pathogenicity. Therefore, the fact that this gene appears to be under positive selection pressure suggests that <i>yicS</i> may be associated with the pathogenicity of APEC. To better understand the role of <i>yicS</i> protein in APEC biological characteristics and pathogenicity, we deleted <i>yicS</i> in an APEC Swollen Head Syndrome strain (APEC strain SCI-07) and studied its effects by comparing wild type and isogenic mutants through comprehensive <i>in vitro</i> and <i>in vivo</i> assays. We demonstrated that <i>vicS</i> plays a role in pathogenic

mutants through comprehensive *in vitro* and *in vivo* assays. We demonstrated that *yicS* plays a role in pathogenicity of APEC. We suggest that the *yicS* gene, which encodes an exporter protein, has a significant role in biofilm formation, motility, invasion of CEC-32 and Hep-2 cells and APEC pathogenicity in a day-old chick model.

1. Introduction

Avian Pathogenic Escherichia coli (APEC) strains belong to the extraintestinal pathogenic group of E. coli (ExPEC) that causes colibacillosis in poultry. These strains cause high morbidity and mortality rates in chickens and are considered an economic threat to the poultry industry worldwide (Barnes et al., 2003). A variety of bacterial factors, such as adhesins, toxins, iron acquisition systems, two-component regulatory systems, miscelleanous related virulence genes, colicin V plasmid, serum resistance proteins, vacuolating autotransporter toxin (Vat), capsule and lipopolysaccharide complexes, as well as exporter or transporter proteins, have been known to act as putative virulence factors of APEC (Barnes et al., 2003; de Paiva et al., 2015a; Dho-Moulin and Fairbrother, 1999; Janben et al., 2001; Parreira and Gyles, 2003; Guabiraba and Schouler, 2015; Verma et al., 2015). Although these virulence factors are recognized as potent causes of pathogenicity, the mechanisms underlying their pathogenicity are still not fully understood.

In recent years, genome-wide analyses have led to a better knowledge about the gene content and genome organization of many different groups of bacteria (Li et al., 2005). Although these techniques provide valuable information for analyses of bacterial virulence, they do no shot a direct relationship with genes and pathogenicity mechanisms.

Positive selection analyses can identify genes that contain a significantly higher than expected frequency of non-synonymous mutations, indicating selection for the emergence of new alleles in place of the old gene copy. If these new alleles are under positive selection, they may be responsible for enhanced fitness, which can indicate participation of this gene in the parasite-host relationship in pathogenic bacteria (Aguileta et al., 2010; Aguileta et al., 2009). In previous work, our group together with the Multiuser Bioinformatics Analysis Laboratory, from EMBRAPA, Brazil, performed positive selection analyses of APEC genomes and identified several genes, including *yicS* that are under positive selection pressure (Rojas et al., 2017).

The role of *yicS* in the virulence of pathogenic *E. coli* is still unclear. The hypothetical protein YicS is highly conserved in *E. coli*, *Salmonella* spp., *Shigella* spp., and *Citrobacter rodentium* (Morin et al., 2013). In addition, *yicS* is located next to the gene *csgD* (Keseler et al., 2013), which is important for the control of biofilm matrix production in *E. coli*. Thus, *yicS* may be related to biofilm formation, which in some bacteria (Wang et al., 2011) plays a role in pathogenicity. Therefore,

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https://doi.org/10.1016/j.micres.2018.05.009 Received 9 February 2018; Received in revised form 4 May 2018; Accepted 12 May 2018 Available online 13 May 2018

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Table 1

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List of Strains and Plasmids used in this work.

Strains or Plasmid	Relevant genotype	Source or reference
Strains		
SCI-07	APEC strain isolated from lesions of a laying hen presenting clinical signs of Swollen Head Syndrome	From our laboratory
DH10β	K-12 E.coli strain	From our laboratory
HB101	K-12 E. coli strain	From our laboratory
DH5a	K-12 E. coli strain	From our laboratory
Plasmids		
pKD3	<i>cat</i> gene	(Datsenko and Wanner, 2000)
pKD46	Amp ^R express λ red recombination	(Datsenko and Wanner, 2000)
pACYC177	Cloning vector	New England Biolabs

Table 2

List of Primers and Sequences used in PCR and qRT-PCR.

Primes used for mutagenesis CAAACTACACTTATGCTTCATGGATGCACATTGCAGAGGGTGGCGCT GTGTAGGCTGGAGCTGCTTC Forward Primer (F AyleS) CAAACTACACTTATGCTTCATGGATGCACATTGCAGAGGTGGCGCT GTGTAGGCTGGAGCTGCTTC Primes used for mutant confirmation Liternal primer Internal primer (F XyleS) ATGAAGCCAACGATGCTACT Reverse Primer (F XyleS2) TTACATATGCGGGCATCT Primes used for mutant confirmation Liternal primer External primer (F XyleS2) ATTTGCAGAAGGTTGCCGCT Reverse Primer (F XyleS3) ATTTGCAGAAGGTTGCCGCT Reverse Primer (F XyleS4) TCTT agetINTGCAGCTACT Primers used for genetic complemented GTCAGTGGTTGTTGCCGTTC Primers used in gRT+CR TCTT agetINTGCAGTACATATATGCGGGCATCTA Primers used in gRT+CR CCCCCACTGTGTTGTTGCCGTTC Primers used in gRT+CR CCCCCCAAGGGTGCAAATTTACG Porward Primer ykS ACGTGGGTGCAAATTTACG Reverse Primer RPA CCCCCCATCTCTCTCGCGGAA Reverse Primer RPA CCCCCCATCGCTGCAGAA Reverse Primer RPA CCCCCCATCGCTGCAGAA Reverse Primer RPA CCCCCCATCGCTGCCGAA Reverse Primer RPA CCCCCCATCGCTGCCGAA Reverse Primer RPA CCCCCCATCGCTGCCGAA Reverse Primer RPA	Primers	Sequences $(5' \rightarrow 3')$
Insure IP Ayes) CAACTICACTITATICGATAGCACTITICGAGAGGTTGCGGT TGTAGGETGGAGGTGGTGGGGGTGTGGGAGGTGGTG Primers used for mutan confirmation GAATTCCGGTAAAGAAGGGTGGTCGCACTGGGGGTGTGGCGGTC CATATGAGTAAGAAGGGTTGGCGGTGTGGCGGTC CATATGAGTAAGAAGGGTGGCGCATGT Primers used for mutan confirmation TTACATATCGGGCATTCTA Primers used for mutan confirmation TTACATATCGGGCATTCTA Primers used for mutan confirmation TTACATGCGGCGCTTCA Primers used for genetic Complemented GTCATGTGTGTGTGCGGTC Primers used for genetic Complemented GTCATGTGTGTGTGCGGTTC Primers used for genetic Complemented TTT caggtgTTACATATCGGGGCATTCTA Primers used for genetic Complemented GTCATGTGGTTGTGCGGTTC Primers used for genetic Complemented GTCATGTGGGGTTAGTG Primers used for genetic Complemented GTCGTGGGGGGTTGTGGGGGCATTCTA Primers used for genetic Complemented GGCGTCGGGGGGTTAGTG Revene Primer y6S ACGTCGGGGGTTGGGGGGTGGGGGGGGGGGGGGGGGGGG	Primers used for mutagenesis	
Beress Primer (R. Ayis5) GAAATCCTGATATCAGGTAAAGAAGCGTTGGTCAGTGGTGTGTGCGGTC CATATGAATATCCTCCTTAG Primers ued for mutant confirmation TTACATATCCAGGTAAAGAAGCGTTGGTCAGTGCGGTC CATATGAATATCCTCCGTTG Primers ued for mutant confirmation TTACATATCCAGGGCATTCTA Primers ued for mutant confirmation TTACATATCCAGGGCATTCTA Primers ued for genetic complemented GTCAGTGGTTGTTGCCGGT Primers ued for genetic complemented TTT engethTGAAAGCAACGATCTACT Primers ued for genetic complemented TCTT engethTGAAAGCAACGATCTACT Primers ued for genetic complemented CACTGCGGCAAAAGCAAACGCAACGATCTACT Primers ued for genetic complemented CACTGCGGCAAAAGCAAACGCAACGATCTACT Primers ued for genetic complemented CACTGCGGCAAAATATCCGGGCGATCTA Primer ued for genetic complemented CACTGGCGCAAAATTCACG Primers ued for genetic complemented CACTGCGCGCAAAATTCACG Primer ued for genetic complemented CACTGGCGCAAAATTCACG Primer ued for genetic complemented CACTGCGCGCAAAATTCACG Primer ued for genetic complemented CACTGGCGCCAAATTCACG Primer ued for genetic complemented CACTGGCGCCAAATTCACG Primer ued for genetic complemented CGCGCTGCACGCTGCGCGCAAACA Primarue fift	Forward Primer (F AvicS)	CAAACTACACTTATGCTTCATTCGATGCACATTTGCAGAAGGTTGCCGCT GTGTAGGCTGGAGCTGCTTC
Primers used for mutant confirmation Internal primer Porvard primer (P, yic3-1) ATCAAGCCAACGATCCTACT Reverse primer (R, yic5-2) TTACATATCCGGGGCATTCTA Primers used for mutant confirmation External primer External primer Fried State (P, yic5-3) Primers used for genetic complemented TTGCAGGGCTGTGTGTCGCGGCAT Forward Primer (P, G, 2, 3ylc5) TCTT argentxTGCAGGGCAAAGAGAAAACC Reverse Primer (P, G, 2, 3ylc5) TCTT argentxTGCATAGCGGGCAATCTA Primers used In qRT+PCR TGTGGGGTGCAAATTTACCGGGCAATCTA Primers used In qRT+PCR CGCGGTCGAAATTTACCGGGCATACTA Reverse Primer yic5 TGTGGCGTGCAAATTTACCGGGCATTCTA Primers used In qRT+PCR CGCGGTCGAAATTTACGG Reverse Primer yic5 CCAGGGCGTCTGA Reverse Primer fibD GCCTCTCAACTGCGTTGGAA Reverse Primer fibD GCCTCCAACTGCGGCAATAT Reverse Primer fibD GCCTCCAACTGCGGCAATAT Reverse Primer fibD GCCTCCAACTGCGGCAAA Reverse Primer fibB TCTGGGGGGGGCGCGCAAA Reverse Primer fibB TCTGGGGGGGGGGCGCAAA Reverse Primer fibB GCCCTCCACTGCAAA Reverse Primer fib	Reverse Primer (R $\Delta vicS$)	GAAATCCTGATATCAGGTAAAGAAGCGTTGGTCAGTGGTTGTTGCCGTTC CATATGAATATCCTCCTTAG
internal primer Forward primer (F yie5-1) ATGAAGCCAACGATCCTACT Reverse primer (R yie5-2) TTACATATCCGGGCATTCTA Primes used for mutant confirmation External primer External primer (F yie5-3) ATTGCAAGAGCTTGCCGCT Reverse primer (R yie5-4) GTCAGTGGTTGTTGCCGTC Primes used for genetic complemented GTCAGTGGTTGTTGCCGTC Primes used (F genetic complemented) TTTT cagettATGAAGAGAAAGCAAGATCTACT Reverse Primer (F C- dyie5) TGTT cagettATGAAGAGAAAAGC Reverse Primer yie5 ACAGTCGGCAAAAGGAAAAACC Forward Primer yie5 TGTGGCGCAAATTTACG Forward Primer yie5 TGTGGCGCTCGGCTGGTAATTTACG Reverse Primer rpoA GCGGTCCATCTGCGGAAATTA Forward Primer fil2 CCGCGGTAAGCTGGTAGA Reverse Primer rfil2 CCTTGCGCAGGAATATT Reverse Primer fil2 CCTGCGGAATAGCGGCTGGAA Reverse Primer fil2 CCTGCGGCAAAGCGGAATAGC Reverse Primer fil2 CCTGCGGCGAAAACCGGAAGAGAAA Reverse Primer fil2 CCTGCGCGGAATAGCGGAAA Reverse Primer fil2 CCTGCGGCGGAATAGC Reverse Primer fil2 CCTGCGCGGAATAGCGGAAAA Reverse Pri	Primers used for mutant confirmation	
Forward prime (P yetS-1)ATGAAGCAACGATCCTACTReverse prime (R yetS-2)TACATACGGGCATTCTAPrimers used for mutant confirmationExternal primer(P yetS-3)ATTGCAGAAGCTTCCCGGCTPrimers used for genetic complementedForward Primer (R-C, AydS)TCTT acgettATGCAGCAACGATGCTACTReverse Primer used in qRT-PCRPrimers used in qRT-PCRPrimers used in qRT-PCRPrimer used in qRT-PCRPrimer used in qRT-PCRReverse Primer ydSCGCGGTGCAAAAGGAAAACCReverse Primer ydSCGCGGTGCGTGATATGTGGGCAAAAGGAAAACCReverse Primer ydSCGCGGTGCGTGATATGTGGGCAAATTTACGReverse Primer ydSCGCGGTGCGGTAAGGGCGCGGCGGGGAGAAGCReverse Primer gbACGCGGTGCGGTATAGTGReverse Primer gbACGCGGTGCGGCTATAGTGReverse Primer gbBCGTCTCAACTGCGGCACGATGTCTReverse Primer gbBCGTCGCAACTGCGGCAACAReverse Primer gbBCCTCAACTGCGGCACAATTReverse Primer gbBCCTCGACGTGCTGCGCAAAReverse Primer gbBCCTCGACGTGCGCGCAAAReverse Primer gbBCCTCGACGGGCGCGATGTReverse Primer gbBCCTCGCGGGGAATATTReverse Primer gbBCCTCGGGGGGATTGTGGGCACAAReverse Primer gbBCCTCGGCGGCAACAAReverse Primer gbBCCTCGGCGGGAACAAReverse Primer gbACGCGCGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGG	Internal primer	
Reverse primer (B. y2-S2) TIGGATATCCGGGCATTCTA Primers used for mutant confirmation H External primer (B. y16-S3) ATTGCAGAAGGTTGCCGCTC Primers used for genetic complemented GTCAGTGGTTGTGCCGCTC Primers used for genetic complemented TICT acgettgTTACATATCCGGGCATTCTA Reverse primer (B.C. Jy16S) TCTT acgettgTTACATATCCGGGCATTCTA Primers used for genetic complemented GCGCTCGCGAAATTTACCGGGCCATTCTA Forward Primer y16S ACAGTCGGCGCAAATTTACCG Reverse Primer y16S CCGCGTCGTGGTAATTTACG Forward Primer y16C CCCCTGCGTCGTGTATTACGG Forward Primer y16C CCAATCCCGTCGGCAACTT Reverse Primer y16C CCAATCCCGTCGGCAACT Forward Primer y16C CCAATCCCGTGGTGTATTGG Forward Primer y16C CCAATCCCGTGGGCAACT Reverse Primer y16C CCAATCCCGTGGCGAACAT Forward Primer y16C CCAATCCCGTGGGGAACT Forward Primer y16C CCAATCCCGTGGCGGAACT Forward Primer y16C CCAATCCCGTGGCGGGAACT Forward Primer y16C CCCCGCGTAAGCTGGGAACT Forward Primer y16C CCCCCGCATAGCCGGGAACT Forward Primer y16C CCCCCGC	Forward primer (F vicS-1)	ATGAAGCCAACGATGCTACT
Primers used for mutan confirmation External primer Forward primer (F y tid-3) ATTIGCAGAAGGTTGCCGCT Permers used for genetic complemented GCCAGTGGTTGCCGTTC Forward Primer (FC, dyds) TCTT acgentATGAAGCCAACGATGCTACT Reverse Primer (KC, dyds) TCTT acgentATGCAAGCCAACGATGCTACT Primers used in qRT-PCR F Forward Primer yics ACAGTCGGCCAAAATTITACG Reverse Primer yics CGCGTCTCAATTITACG Reverse Primer yics CGCGTCTCGTAATGTGG Reverse Primer yics CGCGTCTGGTCGGAAAGGAAACCC Reverse Primer fibD CGCGTCGCAAATTITACG Reverse Primer fibD CGCGTCGGAACATTITACGG Reverse Primer fibD CGCGTCGCAACGACTCGA Reverse Primer fibD CGCGTCGCAACGACACTGGACGAA Reverse Primer fibD CGCGCGTCGGAACGACTGGACGAA Reverse Primer fibD GGCTTCGCACGAAA Reverse Primer fibD CGCCGCATAGCTCAGTGAAGCAA Reverse Primer fibD GGCCTCGCGCATAGCTAGTGAAGCAA Reverse Primer fibD GGCCTCGCGCATAGCAA Reverse Primer fibD GGCCTCGCGCATAGCACAAGCAGCAAA Reverse Primer fibD GGCCCTCGCGCGAAACTTGAAACA	Reverse primer (R vicS-2)	TTACATATCCGGGCATTCTA
Bread primer Forward primer (P yics-3) ATTEGCAGAAGGTTGCCGCGT Primers used for genetic complemented CTT acgettATGAAGCCAACGATGCTACT Porward Primer (P C. Sylcs) TCTT acgettATGAAGCCAACGATGCTACT Reverse Primer (P C. Sylcs) TCTT acgettATGAAGCCAACGATGCTACT Reverse Primer (P C. Sylcs) TCTT acgettATGAAGCCAACGATGCTACT Reverse Primer yels ACAGTCGGCAAAATTTTACG Forward Primer yels GCGGCTCGTTTATGTG Reverse Primer poA GCGGCTCGTTATAGTG Reverse Primer filc CGAGTCGCTTGGTAGTAGTGG Reverse Primer filc CGAGTCGCTTGGTAGTAGTGGGAAATTT Reverse Primer fild CCTCAACTCGATGCAGGAAA Forward Primer fild CCTCAACTCGATGCAGGAAA Reverse Primer fild CCTCAACTCGATGCAGGAAA Reverse Primer fild CCTCAACTCGATGCAGGAAA Reverse Primer fild CCTCAACTCGCCATAGCA Reverse Primer fild CCTCAACTCGCCATAGCA Reverse Primer fild GCGCCTGGGATAGCTGAGCAAA Reverse Primer fild GCGCCTGGGCATAGCT Forward Primer fild GCCCCCGCCATAGCA Reverse Primer fild GCGCCCTGGGCATAGCT Reverse Primer f	Primers used for mutant confirmation	
Forward primer (Py vis-3)ATTICGAAAAGGTTGCCGCTRevene primer (Py vis-3)GTCATGGTTGTTGCCGTTCPrimers used for genetic complementedForward Primer (Pc. Cy/sc)TCTT aggrtfaTGAAGCCAACGATGCTACTRevenes Primer (Pc. Cy/sc)TCTT aggrtfaTGAATATCCGGCAATTATAPrimers used in qRT-PCRForward Primer y/sCCGCGTCATCTTCTTCGGARevenes Primer y/sCCGCGTCATCTTCTCGGARevenes Primer y/sCCGCGTCGTGGTTAATGGRevenes Primer y/sCCGCGTCGTGGTTAATGGRevenes Primer y/sCCGCGTCGTGGTTAATGGRevenes Primer y/sCCGCGTCGTGGTGAATGTTCTGGRevenes Primer y/sCCGCGGTCGGCAGAGTTGTRevenes Primer y/sCCGCGGTCGGGTGGGAAATTTRevenes Primer y/sCCGCGGCGTGGGTAAGTGGGAAAGAGAAACCRevenes Primer y/sCCGCGGCGGCGGTGGGGTGGGAAGAGAAGAGAAAGAGAAAGAGAAAGAGAAAGAGAAAGAG	External primer	
Reverse primer (R, yds.2-4)GTCAGTGGTTGTGCCGTTCPrimers used for genetic complementedIForward Primer (FC. SylcS)TCTT acgettATGAAGCCAACGATGCTACTReverse Primer (RC. SylcS)TCTT acgettATGAAGCCAACGATGCTACTPrimers used in QRT-PCRIForward Primer yidSACAGTCGGCAAAATTTTACGReverse Primer poAGCGGTCGTCGTTTTTACGForward Primer poAGCGGTCGTGGTTATGTGGForward Primer filCGCCGTCGGTCGGATTATGTGForward Primer filCGCGCTCTGGCGAAATTGTGReverse Primer filDGCTCTCAACTCGGTCGGTTGTATGGGAAAGCReverse Primer filDGCTCTCAACTCGGTGCTGGTAGAAGCReverse Primer filDGCTCTCAACTCGGTGGCTTGCAAAReverse Primer filDGCTCTCAACTCGGTGGCTTGCAAAReverse Primer filDGCTCTCAACTCGGTGGCTGGAAAReverse Primer fildCCTCAACTCCATGCGCAAAAReverse Primer fildGCCGCGAAAGCTGCAAAAReverse Primer fildGCCGCGGAAAAGCTGGGAAAAReverse Primer fildGGCGTTGCGCAAAACAReverse Primer fildNGGCGCTGGGAAAATGTTGGAACAReverse Primer fildNGGCGCTGCGCAACACTGForward Primer marBGGACATTGCCACAAACACForward Primer marBGGACATTGCCACAAACACForward Primer marBGGACATTGCCACAAACACForward Primer marBGGACATTGCCACAAACACForward Primer marBGGACATTGCCACAACACTGForward Primer marBGGACATTGCCACAACACTGForward Primer marBGGACATTGCCACAACACTGForward Primer marBGGACATTGCCACAGATGTGGGAACAForward Primer marBGGACATTGCCACAGATGTGGGAACACTTGFo	Forward primer (F vicS-3)	ATTTGCAGAAGGTTGCCGCT
Primers used for genetic complemented Forward Primer (P.C. Jylc5) TCIT acettATGAAGCCAACGATGCTACT Reverse Primer ylc5 CACGTCGCCAAAAGAGAAAACC Primers used in qRT-PCR	Reverse primer (R vicS-4)	GTCAGTGGTTGTTGCCGTTC
Forward Primer (R-C. sylc3)TCTT acgettATGAAGCCAAGCATGCTACTReverse Primer (R-C. sylc3)TCTT acgettATGAAGCCAAGCATCTAPrimers used in QRP-PCKForward Primer yic3ACAGTCGGCGAAAAGAGAAAACCReverse Primer yic4GCGCTCATCTTCTCCGAPorward Primer paAGCGCTCATCTTCTCCGAReverse Primer paAGCGCTCATCTTCTCCGAReverse Primer flfCCAATCCGGTCGAGTTATGTGPorward Primer flfDTCTTGCGCAGCGCTTCTReverse Primer flfDCCCTCCATCCGGCAGAAAReverse Primer flfDGCTCTCAATCCGGTCGAGAAAReverse Primer flfBDGCTCTCAATCCGGTCGAGAAAReverse Primer flfBDGCTCTCAATCCGGTCGCAGAAReverse Primer flfBGCCTCCATCCGGCAGAAATTReverse Primer flfBGCCTCCATCCGGCAGAAAReverse Primer flfBGCCTCCATCCGGCAGAAAReverse Primer flfBGCCCTCGCCCCACAAReverse Primer flfBGCCCTCGCCCCCCCCACAAReverse Primer flfBGCCCTCGCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC	Primers used for genetic complemented	
Reverse Primer (R.C. Δyt.S) TCTT cargitggTTACATATCCGGGCATTCTA Primers used in qRT-PCR	Forward Primer (F-C AvicS)	TCTT agettATGAAGCCAACGATGCTACT
Primers used in qRT-PCM Forward Primer ytsS ACAGTGGGCAAAAGAGAAAACC Reverse Primer ytsA GGGCTAACTGGCAAATTTTACG Forward Primer ptA GGGCTCATCTTCTTCGGA Reverse Primer ptA GGGCTCATCTTCTTCGGA Forward Primer ptA GGGCTCATCTTCTTCGGA Reverse Primer ftBC GCGCTCAACTGGGTCTGA Forward Primer ftBD GCTCCAACTGGGTCTGAA Reverse Primer ftBD GCTCCAACTGGGCTGTAA Reverse Primer ftBD GCTCCAACTGGGATAATT Reverse Primer ftBD GCCGTCCAATGGGAAAA Reverse Primer ftBD GCCGCGATAAGCTGGAAA Reverse Primer ftBD GCCGCGAAAAGTGAAAAAA Reverse Primer ftBC TCTGGGTGGTGCACAA Forward Primer ftBA GGGCGTTGGACACA Reverse Primer ftBA GGGCGTGGAGATAGCTGTGAAAC Forward Primer marB CGCACATGCCACAGGAACTACA Forward Primer marB CGCACCTGCGCCCATACA Reverse Primer ftBA ATGCGGCCCAGGACACTTG Forward Primer marB CGCACTGCACACA Reverse Primer marB CGCGCCCCCCTCCCCCTGCA Reverse Primer marB CGCGCCCCCCCTGCA Reverse Primer marB CGCGCCCCCCCTGCACACA Reverse Primer ma	Reverse Primer (R-C AvicS)	TCTT cacettere/TACATATCCGGGCATTCTA
Forward Primer yik3ACAGTCGGCAAAAGAGAAAACCReverse Primer yik3TGTGGCGTGCAAATTTTACGForward Primer yik3GCGCTGCACTTTCTCGAReverse Primer fildGCCGTTGAATGTGForward Primer fildGCCGTTGCACGGTCGAAReverse Primer fildGCCGTTGCACTGGGTCGAAReverse Primer fildGCCTTCAACTCGCGCTTGGTAAGAForward Primer fildGCCTTCCAATGCGCAGCGCTTGCTGAAForward Primer fildGCCTCCAATTGCGGAAATTTReverse Primer fildGCCTCCAATTGCGGAAATATTReverse Primer fildGCCCCCAATGCAGCAAAForward Primer filgECCTCAACTCCATGGGCACCAAAReverse Primer filgETCTCTGGTGGTTGCGCACAAReverse Primer filgBGCCCGTGGTAGTGCACAAAReverse Primer filgVGGGCGTGGGAATGTTGGAAACReverse Primer filgNGGGCGTGGGAAATGTTGAAACForward Primer marBCGACATGCCACAGAACAReverse Primer marBCGGCACTGCCCAGGAACAReverse Primer marBGGCCTCCCCTGTCAReverse Primer waMGCCCCTCCCCCTGTCAReverse Primer waMGCCCTCCCCCTGTCAReverse Primer waMGCCCTCCCCCTGTCAReverse Primer waMGCCCTCCCCCTGTCAReverse Primer waMGCCCTCCCCCTGTCAReverse Primer waMCGAACGATGGCACAATCATReverse Primer marBCGAACGAGGGCGATTGGForward Primer yufCCGAACGATGCGCACAAACAReverse Primer marACGACGGCGGCACTACCAReverse Primer marACGACGCGCGCTTACGGCGAAAReverse Primer marACGACGCGCGCTTACGGCGAAAReverse Primer marACGGCGGCGCGCTTACGGCGAAAAGCReverse Primer marA </td <td>Primers used in aRT-PCR</td> <td></td>	Primers used in aRT-PCR	
Reverse Primer yikSTGTGGCGTGCAAATTTTACGForward Primer yoAGCGCTCATCTTCTTCCGAForward Primer filcGCGTTGAACTGGTTATGGForward Primer filcGCGTTGAACTGGTCTGCAForward Primer fildGCGTTCAACTGGTTCGCAGAAForward Primer fildGCTCTCAACTGGTTGCGAGAAForward Primer fildGCTCCAACTGGCTGCGAGAForward Primer fildGCTCCAACTGGCTGCTGCAGAReverse Primer ompRGCGTCCAACTGGCTGCAGAAReverse Primer filgECCCGCGGATAAGCTGCACAAReverse Primer filgETCTGGGGGTGCCACAAReverse Primer filgVGACCGTTGCACCACAAReverse Primer filgVGCGCGTGGAACTGTGCACAAReverse Primer filgVGCGCGTGGGAACGTGTGCCACAAForward Primer filgVGCGCGTGGGAACGACAReverse Primer filgVGCCGCTGGGAACGTGTGCCACAGAForward Primer maBCGCACTGCCCACGAGAGTAACForward Primer yebRATGCGGCAGGAGCATTGForward Primer webRATGCGGCAGGAGCAGTGTForward Primer webRAATGCCGCCAGGAGCAGTGTForward Primer webRAATGCCGCAGGAGCAGTGTForward Primer webRCGACAGGCGCGATTGGReverse Primer mpACGAACGGTGCGACAAGCAReverse Primer mpACGAACGGCGCGAATGCTForward Primer ppdCCGAGCGGCGAATGCForward Primer ppdCGCGCCGCGCGGAATGCForward Primer ycfGAACGCCCGCGCGCGAATAGCForward Primer ycfGAACGCCCGCGCGCGCGCGATAGCReverse Primer ycfGAGCGCTCAGGCGCATACReverse Primer ycfGAGCGCTCGCCGCGAAAReverse Primer ycfGAGCGCCTCGCCGCATACReverse Primer ycf <td>Forward Primer vicS</td> <td>ACAGTCGGCAAAAGAGAAAACC</td>	Forward Primer vicS	ACAGTCGGCAAAAGAGAAAACC
Forward Primer poAGGGCTCATCTTCTCGGAReverse Primer ptaACGCGGTGGGTTATGTGForward Primer fliCCAAATCCGGTCGGGTCGGAReverse Primer fliDGGTCTCAACTCGGTCGGAForward Primer fliDGGTCTCAACTGGCTTGCGAAForward Primer mpRGGGTCCAATCGCGTGGAAForward Primer mpRGGGTCCAACTGGCTGGAAForward Primer flgECCTCAACTGCGTGGAAForward Primer flgECCTCAACTGCATGGAGCAAAReverse Primer flgECCTCAACTGCATGGAGCAAAReverse Primer flgECCTCAACTGCATGGAGCAAAReverse Primer flgECCTCAACTGCATGGAGCAAAReverse Primer flgBGGCGTGGACACAReverse Primer flgNGGCGGTGGACACAReverse Primer marBCGACATTGCCACAGGAAGTAACForward Primer warBCGCACTGGCGACACAReverse Primer marBCGACATTGCCACAGGAAGTAGTForward Primer warBCGCACTGCCCCGTGTCAReverse Primer marBCGACATTGCCACAGGAAGTAGTForward Primer warBCGCACTGCGCGGACAReverse Primer marBCGACATGCCGGAACAReverse Primer marBCGACATGCCGCGATGTForward Primer pdRCGCACTGCGCGCGATGTForward Primer mgACGACGCGCGCGATTGGForward Primer mgACGACGCGCGCGATGGGGAGAGTGAReverse Primer mgACGACGCGCGCGATGGGGAGAGAReverse Primer mgACGACGCGCGCGATGGGGAGAGAReverse Primer mgACGACGCGCGCGCGATGGGGAGAGGAGGGGGGGGGGGGGG	Reverse Primer vicS	TGTGGCGTGCAAATTTACG
Reverse Primer podCGCGGTCGTGGTTATGTGForward Primer filcGCCGTTGAACTGGGTCTGAReverse Primer fildGCGTTCAACTGGCTTGCAGGAAForward Primer fildGCGTTCCAACTGCGGAAForward Primer ompRGCGTTCCAATGCGGATATTReverse Primer ompRCCGGGGTGTGGTGGCGAAGAForward Primer figECCTCAACTGCGGAAACTGCAAGAAForward Primer figECCTCAACTGCAGGCAAAForward Primer figETTCTGGGTGGTGTGCCACAAForward Primer figECCCGACTGCGCGCATACAForward Primer figBGGCGTTGGCGCCAAACForward Primer figBGGCGTGGGGGACAAReverse Primer marBCGACGTTGGCGCACAACForward Primer marBCGCCCTGGCGGAACAReverse Primer marBCGCCCTGCCCCTGTGReverse Primer marBCGCCCTGTCGCAACGGGCGGTGGForward Primer wcaMGCCCTCTCCCCCTGTCAReverse Primer marBCGCCCTCTCCCCCTGTCAReverse Primer marBCGCCCTCTCCCCCTGTCAReverse Primer marBCGCCCTCTCCCCCTGTCAReverse Primer marBCGCCCTCTCCCCCTGTCAReverse Primer marBCGCCCTCTCCCCCGTGTAReverse Primer marBCGCCCTCTCCCGCAATTGForward Primer marAAAAGGGCCCATTCGReverse Primer marACGCCCTCCCCCCTGTCGAAGAReverse Primer marACGCCCCCCCGCATTCGGForward Primer marACGCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC	Forward Primer moA	GCGCTCATCTTCCTCCGA
Forward Primer fileGCCGTTGAACTGGGTCTGAReverse Primer fileCAAATCCCGTCTGAGGAAForward Primer fileCTCTGGCGAGGCTCTReverse Primer fileGCGTTCCAACTCGCTTGCTGAAForward Primer ompRGCGTTCCATGCGGATATTReverse Primer ompRCCCCGCGATAGGTGATGAAForward Primer fileCTCTGACTCCATGCGACAAAForward Primer fileCCCCGCGATAGGTGATGAAForward Primer fileGCCGTCGCCCCATACAForward Primer fileGCCGTTCGCCCCATACAReverse Primer fileGGCGCTGGAAATGTTGCACACAReverse Primer fileGGCGCTGGAAATGTTGCACACAReverse Primer fileGGCGCTGGAAATGTTGCACACAReverse Primer maBGGCCCTCGCCCGGATACAReverse Primer maBCGACATTGCCACAGGAACTGForward Primer yehRTCTTCAACCCCGGATGTForward Primer yehRTCTTCAACCCCGGATGTForward Primer mpAAATGGCGAGAGGCGATTTGForward Primer npAAATGGCGGCAGACAATGAReverse Primer npAAATGGCGGCAGACATGGForward Primer npAAATGGCGGCAGTTTGGForward Primer npAAAAGGGTCGTCTCTCGACAGAReverse Primer ppACCGACGCTCTCTCCGTTGAAReverse Primer npAAAACGGCTCTTCGGACAAAReverse Primer ynfCTGAGCAAGGTGAAGGAGGAATGGCGAATGCForward Primer ynfCGAGCTCCGCGCGTATAGGCGAATAGCAForward Primer ynfCGAGCTCCGGCGCATAGCGAGAGAForward Primer ynfCGAGCTCCGCGCGTATGCGGAAAGCGTTForward Primer ynfCGGCGCTTAGGGTACGCGGAATAGCForward Primer ynfAGGCGCTTAGGGCAACAAAGGTCAForward Primer ynfAGGCGCTTAGGGCAACACAAAGGTTGC	Reverse Primer moA	CGCGGTCGTGGTTATGTG
Reverse Primer filtCAAATCCCGTCTCGACGAAForward Primer filtTCTTCGCGACGACCTTCTReverse Primer filtGCTTCCAACTGCTTGCTGCAAForward Primer ompRGCGTTCCATTGCGGAATATTReverse Primer figECCTCCAACTCCATTGCGGAATATTReverse Primer figECCTCCACTCCATGCGCAAAForward Primer figECCTCCACTCCCATCACCAAAReverse Primer figEGCCCTCGACTGCACAAForward Primer marBGGCCTTGCGAACAReverse Primer marBCGCCCCGGAACAReverse Primer marBCGCCCTGGAACATGTReverse Primer marBCGCCCTCGCCCCATGCReverse Primer marBCGCCCTCGCAAGAGAGTAACForward Primer warBCGCCCTCCCCTGTCAReverse Primer marBCGCCCTCCCCCTGTCAReverse Primer marBCGCCCCCCCCTGTCAReverse Primer marBCGCCCCCCCCTGTCAReverse Primer marBCGCCCCCCCCCCTGTCAReverse Primer marBCGCCCCCCCCCCTGTCAReverse Primer marBCGCACATGGCAAGGAAGAATCATForward Primer marAAAGGGCGATTGGReverse Primer marACGCACCTCGCCCCTGTCAReverse Primer marACGACGATGCGCAAATCATForward Primer marAAAAGGGCGATTGGForward Primer marACGACAGGCGAATCATForward Primer marAAAAGGCTCGCCCCCTTTCGForward Primer marACGGCCTCCCCCGTTTATGGForward Primer marAGGCCCTCCCCCGTTTATGGCGCAAAAReverse Primer marAGGCCCTCCCCGCGTTAATGACCReverse Primer marAGGCCGCTCCCCGCGTTAATGACCReverse Primer marAGGCGCGTTAATGCCCCAGAAAReverse Primer marAGCGCGCGCGCAAAAAGCTT	Forward Primer fliC	GCCGTTGAACTGGGTCTGA
Forward Primer fibTCTTGGGAGGGCTTGEReverse Primer fibGCTCTCAACTGGCTTGCTGAAForward Primer ompRGCGTTGCAATATTReverse Primer ompRCCCGGGATAGCTGGAGAForward Primer fgETCTGGGTGGCACAAReverse Primer fgETCTGGGTGGCACAAReverse Primer fgNGACGTTGCGCACAAReverse Primer fgNGGCGCTGGAAATGTTGCGAAACReverse Primer fgNGGCGCTGGAAATGTTGCGAACAReverse Primer marBCGACATTGCGCACAGAReverse Primer marBCGACATTGCCACAGGAAGTAACForward Primer warMATGGCCGTGCGCACATGReverse Primer warMGCCCTCCTCCCCTGTCAReverse Primer warMGCCCTCCTCCCCTGTCAReverse Primer warMGCCCTCCTCCCCTGTCAReverse Primer warMGCCCTCCTCCCCTGTCAReverse Primer warMAATGGCAGGGCGATTTGForward Primer warMAATGGCAGGGCGCATTGForward Primer mpACGAACGATGCGACAAATCATForward Primer npACGAACGATGCGACAAATCATForward Primer npACGACGATGCGGCGATTGGForward Primer npACGACGATGCGGCGATTGGForward Primer npACGACGATGCGGCGAATCATForward Primer npACGACGATGCGCGGAATCATForward Primer npACGACGATGCGCGCGAATCATForward Primer npAGAGCGTGCGCGCGAATCATForward Primer npAGAGCGTGCCCCGCGAATCATForward Primer npAGGCCGTTGCGCGCGCGAATCATForward Primer npAGAGCGCGTGCCCCGCGAATCATForward Primer npAGAGCGCGCTGCGCGCGCGCGCGAATCACReverse Primer npAGGCCGTGCCCCCGCGAATAGCCReverse Primer npAGGCCGTGCCCCCGCGAATAG	Reverse Primer fliC	CAAATCCGTCTCGACGAA
Reverse Primer fhDGCTCTCAACTCGCTTGCTGAAForward Primer ompRGCGTTCCATTGCGGAATATTReverse Primer ompRCCCGCGATAGCTGATGAAForward Primer fgECCTCAACTCCATGCAGCAAAReverse Primer fgETTCTGGTGGTTGCCACAAReverse Primer fgBNGGCGCTGGAAATGTTGGACACAReverse Primer fgNGGCGCTGGAAATGTTGGACACAReverse Primer marBAGGGCTTGCGCACAAReverse Primer marBCGCACTTGCGCACAACCForward Primer ychRATGCCGCCGGAACAReverse Primer ychRTCTTCAACACCGGGACACTTGReverse Primer ychRTCTTCAACACCGCGGATGTForward Primer ychRCGCACTGCCCCCGTGCAReverse Primer mpAACGCACTCCCCCCCGTCAReverse Primer mpACGCACTGCCCCCGTGTCAReverse Primer mpACGCACGGAGGCGATTTGForward Primer ychRCGACGCGCGGCGCGTCAReverse Primer mpACGAACGATGCGATGCTGCAAGAReverse Primer mpACGAACGATGCGATGCTGCAAGAReverse Primer mpACGAACGATGCGACAATCATForward Primer ppCCGACGCGCGATTTCGForward Primer ppCCGCACGCGCGCATTCGForward Primer ynfCAAACAGCCTTCTTCCGACAAAReverse Primer ynfCCGAACGTGCGCGCGAATAGCReverse Primer ynfCGGACGTGGCGCGCTTACGForward Primer ycCTAGATGACAGTACGCTGCTTTCGForward Primer ycCTAGATGACAGTACGCTGCTTTCGForward Primer rxtAGTCCCCCGCGTAATGCCReverse Primer ydcKCCTTCGCCGCTTACGAAAReverse Primer rxtBCAGGGGGTCATCCCCAGAAAReverse Primer rxtBCAGGCGGCTCTACGAAAAGGTTCAReverse Primer rxtA <t< td=""><td>Forward Primer flhD</td><td>TCTTGCGCAGCGCTTCT</td></t<>	Forward Primer flhD	TCTTGCGCAGCGCTTCT
Forward Primer ompRGCGTTCCATTGCGGAATATTReverse Primer ompRCCCGGCATTAGCTGATGAAForward Primer flgECTCTGGGTGGTTGCCACAAReverse Primer flgETTCTGGGTGGTTGCCACAAForward Primer flgNGACCGTTCGCCCCATACAReverse Primer flgNGGCGTGGGAATGTTGAAACForward Primer marBAGGGCGTTGCACAGAGAAGAACAReverse Primer marBCGACATTGCCACAGAAGTAACForward Primer warBCGACATTGCCACAGGAAGTACAReverse Primer warBCGACATTGCCACAGGAAGTACAForward Primer warBCGCCTCTCCCCTGTCAReverse Primer warMGCCCTCTCCCCCTGTCAReverse Primer warMGCCCTCTCCCCCTGTCAReverse Primer warMCGAAGGGTGAGAGTTGForward Primer mpAAATGGCAGAGGGCGATTTGForward Primer mpACGAAGGTGCGAGCACTTGGReverse Primer mpACGAAGGTGCGGAGAGAReverse Primer mpACGAAGGTGCGGAGAGTForward Primer mpACGAAGGTTGGGAGAGAReverse Primer mpACGAAGGTGCGGGAGAAGAReverse Primer mpACGAAGGTGCGGGAAATGCGForward Primer mpACAAGAGCGCGCTTCTCCGGACAAAReverse Primer mpCCGAGCGGCGCGGGGAATAGCReverse Primer mpCGAACGCGCCGCTAATGACGAAReverse Primer mpACGCGGCGCCTCACGGTAATGCReverse Primer marAGTCGCACGCGTAATGCACAGAAReverse Primer marAGTCGCCCGCGTAATGACCForward Primer marAGTCGCCCGCGTAATGCACAGAAReverse Primer marAGTCGCCCCGCGTAATGACCForward Primer marAGTCGCCCCGCGAAAReverse Primer marAGTCGCCCCGCGTAATGCACAGGAAReverse Primer marA	Reverse Primer flhD	GCTCTCAACTCGCTTGCTGAA
Reverse Primer ompRCCCGGGATAAGCTGATGAAForward Primer fgECCTCAACTCCATGCAGCAAAReverse Primer fgETTCTGGGTGGTGGCACAAReverse Primer fgNGACCCTTGGCCCCATACAReverse Primer fgNGGGGCTGGAAAAGCTTGGAACAForward Primer marBAGGGCGTTGCGGAACAReverse Primer marBCGACATTGCCACAGGAAGTAACForward Primer warBCGACATTGCCACAGGAAGTAACForward Primer yahRATGCCGCCAGGACACTTGReverse Primer marBCGACCCCCCCGTGTCAReverse Primer yahRTCTTCAACACCCCGGATGTForward Primer wadMGCCTCCTCCCTGTCAReverse Primer npAAAAGGGTCGATGCTGGAAGAReverse Primer npACGAACGATGCGACAATTCATForward Primer mpACGAACGATGCGACAATTCATForward Primer npACGAACGATGCGACAATTCATForward Primer npACGAACGATGCGACAATTCATForward Primer ppCCGAATGCTGCGATTGGReverse Primer npACGAACGCGTTCTGCGAAAAReverse Primer ppCTTGGCAAGGTGAATGGACGAAAReverse Primer ppCCGACTGCGCGCGAATAGCReverse Primer yxfCAAACAGCTGCGGCGGAATAGCReverse Primer yxcTAGACACTGCGCGCTAATGACTReverse Primer yxcKCCTTTGATGGCGACACGCTTReverse Primer xxAGTGCACTGATGCCCCAGAAAReverse Primer xxBCGAGGGATGCCCCAGAAAReverse Primer xxBCGAGGGATGCCCCAGAAAReverse Primer xxBCGAGGGATGCCCCAGAAAReverse Primer xxBCGAGGGATGCCCCAGAAAReverse Primer xxBCGAGGGATGCCCCAGAAAReverse Primer xxBCGAGGGATGCCCCAGAAAReverse Primer xxBCGAGGGA	Forward Primer ompR	GCGTTCCATTGCGGAATATT
Forward Primer figECCTCAACTCCATGCAGCAAAReverse Primer figETTCTGGGTGGTCGCCAAAForward Primer figNGACCGTTGGCCCCATACAReverse Primer figNGGCGTTGGACACAReverse Primer marBAGGCGTTGCGCAACAReverse Primer marBCGACATTGCCACAGGAAGTAACForward Primer marBCGACATTGCCACAGGAAGTAACForward Primer marBCGACATTGCCACAGGAAGTAACForward Primer yehRATGCCGCCAGGACACTTGReverse Primer wcaMGCCCTCCTCCCCTGTCAReverse Primer wcaMAATGGCAGCAGGCGATTTGForward Primer nlpACGAAGTGCGACAGAGAGAReverse Primer wcaMAATGGCAGCGGCGATTGGForward Primer nlpACGAAGTGCGACGATGCGACAAATCATForward Primer nlpACGAAGGTGGACGATGCGACAAATCATForward Primer nlpACGAAGGTGCAAGTGCGACAAATCATForward Primer nlpACGAAGGTGCAAGTGCACAAAReverse Primer nlpACGAAGGTGCAAGTGCGACAAATCATForward Primer nlpACGAAGGTGCGCGGAATTCGReverse Primer nlpACGAAGGTGCGCGGAATAGCReverse Primer nlpACGACGCAAGTGCGCGGAATAGCReverse Primer nlpACGAGCGCAAGTGCGCGGAATAGCReverse Primer nlpACGAGCGCGCCTTTCGReverse Primer nlpAGGCCCCCGGCGAATAGCReverse Primer nlpAGGCCGCCCTCTGCCGTTTAATGACTReverse Primer nlpAGGCGGCTCATACGGTCATACReverse Primer nlpAGGCGCGCTCATAGCGTCATACReverse Primer nlpACGAGGGACAAAAGGTTCAReverse Primer nlpACGGGGCTTAACGCCTCTCGCCTTTGReverse Primer nlpACGAGGCGACCACGACGATACReverse Primer nlpACGAGGCGACCACGACG	Reverse Primer ompR	CCCGCGATAAGCTGATGAA
Reverse Primer figitTTCTGGGTGGTTGCCACAAForward Primer figitGACCGTTGCGCCCATACAReverse Primer figitGGGCGTGGCAATGTTGCAAACReverse Primer marBAGGGCGTTGCGGAACAReverse Primer marBCGACATTGCCACAGGAAGTAACForward Primer marBCGACATTGCCACAGGAAGTAACForward Primer warBCGACATTGCCACAGGACACTTGReverse Primer yehRTCTTCAACACCCGCATGTForward Primer wcaMGCCCTCCTCCCCTGTCAReverse Primer wcaMAATGGCAGAGGCGATTTGForward Primer mpAAAAGGGTCGATGCTGGAAGAReverse Primer mpACGAACGATGCTGCGAAGAReverse Primer mpACGAACGATGCTGCGAAGAReverse Primer mpACGAACGATGCGCGCAAATCATForward Primer ppCCGAACGATGCCGCGCGAATACAReverse Primer ppCCTGCCGCGCGCAATCGReverse Primer ymfCAAACAGCTTCTTCCGACAAAReverse Primer ymfCCGACCTCCTCCCCCTGTTATGGCReverse Primer ymfCCGACCTCCTCCCCGCGGAATACCReverse Primer yccTGAGACGTCGCGGCGAATACCReverse Primer yccTGAGACGTCCGCGCGTTAATGACTReverse Primer ydcKCCTTTGATGCGCACACAAForward Primer ydcKCCTTTGATGCGCACACACAForward Primer rstAGCGCGGCTTAACGCTAACForward Primer rstBCAAGGATTGCCCCAGAAAReverse Primer interACGAGGCGTAACGGTTCACForward Primer interAGCGCGGCTTAACGGTTCACForward Primer interAGCGCGGCTTAACGGTTCACForward Primer interAGCGCGGCTTAACGGTTCACForward Primer interAGCGCGCTCACGACACACACGCTTTForward Primer interACGAGGCGTTAACGGTTCATGA <td>Forward Primer flgE</td> <td>CCTCAACTCCATGCAGCAAA</td>	Forward Primer flgE	CCTCAACTCCATGCAGCAAA
Forward Primer fgNGACCGTTCGCCCCATACAReverse Primer fgNGGCGCTGGGAAATGTTGGAAACForward Primer mrBAGGGCGTTGCGGAACAReverse Primer marBCGACATTGCCACAGGAACAReverse Primer marBCGACATTGCCACAGGAAGTGTForward Primer yehRATGCCGCCAGGACATGTReverse Primer wcaMAATGCCGCCGGGATGTForward Primer wcaMAATGCCGCAGGCATTGGReverse Primer wcaMAATGCCGCAGGACATTGTForward Primer nlpAAAAGGGTCGATGCTGGAAGAReverse Primer nlpACGAACGTCGCACTGTGAReverse Primer nlpACGAACGTTCGGTTGAReverse Primer ppdCCGGCGCGATTTCGForward Primer ppdCCGACGATCGGCGAATTCGTForward Primer ynfCAAAACAGCCTTCTTCCGACAAAReverse Primer ynfCGAGCATGCGGCGGAATAGCReverse Primer ynfCGAGCACGCCGCGTTATGGCTGCATTGGForward Primer ynfCGAGCACGCGCGGAATAGCReverse Primer ynfCGAGACTGCCGCGGTAATGACGTGCTTTCGForward Primer ynfCGAGACTGCGCGGGAATAGCReverse Primer ynfCGGCGCTCTCCCCCGTTATGACTReverse Primer ynfCGGCGCTCTCCCCCGCGTTATGACTReverse Primer ynfCGGCGCTCCCCCGCGTTATGACTForward Primer ynfCGGCGCTCCCCGCGTTATGACTForward Primer ynfCGGCGCTCCCCCGCGTTATGACReverse Primer ynfCGGCGCTCCCCCGCGTTATGACTForward Primer ynfCGGCGCTCCCCGCGTTATGACForward Primer ynfCGGCGCTCCCCCGCGTTATGACForward Primer ynfCGGCGCTCCCCCGCGTTATGACForward Primer ynfCGGCGCTCCCCCGCGTTAATGACForward Primer ynfCGGCGCTCCCCCCGCGTTACGCCCT <td>Reverse Primer flgE</td> <td>TICTGGGTGGTTGCCACAA</td>	Reverse Primer flgE	TICTGGGTGGTTGCCACAA
Reverse Primer JdNGGCGCTGGAAATGTTGAAACForward Primer marBAGGCGTTGCGGAAACAReverse Primer marBCGACATTGCCACAGGAAGTAACForward Primer yehRATGCGCGCAGGACACTTGForward Primer yehRTCTTCAACACCCGCGATGTForward Primer wcaMGCCCTCCCCCTGTCAReverse Primer wcaMAATGGCAGGGGCGATTGForward Primer mpAAAAGGGTCGATGCTGGAAGAReverse Primer mpACGAACGATGCGATGCTGGAAGAReverse Primer mpACGAACGATGCGATGCTGGAAGAReverse Primer mpACGAACGATGCGATGCTGGAAGAReverse Primer mpACGAACGATGCGATGCTGGAAGAReverse Primer ppCCTGCGCCGCATTTCGForward Primer ppCCTGGCGCGATTTCGForward Primer ynfCAAACAGCCTTCTTCCGACAAAReverse Primer ynfCTGAGCAAGGTGAAGTGACGAAForward Primer ynfCGAGACTGCGGCGGATAGCReverse Primer ynfCGAGACTGCGCGCGTTATGACReverse Primer yccTAGAGCGCGCCTTTTCGForward Primer ycdKGCTCTCGCCGTTAATGACTReverse Primer ydcKGCTCTCTGCCGCATACReverse Primer rstAGCCGGCTCTACGGCACAAAReverse Primer rstBCAGGGATTGCCCCAGAAAReverse Primer rstBCGAGGCACAAAAGGTTCAForward Primer iucAACTGCTGACAGGACAGCCTTTForward Primer iucAGGCGGTTAAACGGTTCATGA	Forward Primer flgN	GACCGTTCGCCCCATACA
Forward Primer marBAGGGCGTTGCGGAACAReverse Primer marBCGACATTGCCACAGGAAGTAACForward Primer yehRATGCCGCCAGGACACTTGReverse Primer yehRTCTTCAACACCCGCGGATGTForward Primer wcaMGCCCTCCTCCCCTGTCAReverse Primer nlpAAAAGGGCGAGAGGAGAGAAGAReverse Primer nlpACGAACGATGCGACAAATCATForward Primer ppdCCGATGTCTGCATTCGGAAGAReverse Primer nlpACGAACGATGCGACAAATCATForward Primer ynfCAAAAGGCCGACTTTCGReverse Primer ppdCCGATGTCTGCATTCGGACAAAReverse Primer ynfCGAGCAGTGACGACAAATCATForward Primer ynfCGAGCAGTGCACAAATCATForward Primer ynfCGAGCATGCCGGCGAATTCGForward Primer ynfCGAGCATGCCGGCGAATAGCReverse Primer ynfCGAGCACTCCGCGCGAATAGCReverse Primer yccTGAGACTCGCGCGGAATAGCReverse Primer ydcKCCTTTGATGCGCGCAATACReverse Primer ydcKCCTTTGATGCCGCATACReverse Primer rstAGCGCGGCTCTACCGTAACReverse Primer rstBCGAGGGGAACAGAAGCTCAReverse Primer rstBCGAGGCGACACAAAAGGTTCAReverse Primer rstCAGCGCGGCTTACCGCATACReverse Primer rstCACGGGGGCACACAGAAGCTCATGCForward Primer rstCACGAGGCGACACAAAAGGTTCAForward Primer rstCAGCGCGGCTACCGAGAAReverse Primer rstCAGCGCGGCTTACCGCATACReverse Primer rstCAGCGCGGCTTACACGACACAAAGGTTCAForward Primer rstCAGCGCGGCTTACACGACACACAGCTTTReverse Primer rstCAGCGCGGCTTACACGACACACGCTTTReverse Primer rstCAGCGCGGTTAAACGGTTCAT	Reverse Primer flgN	GGCGCTGGAAATGTTGAAAC
Reverse Primer marBCGACATTGCCACAGGAAGTAACForward Primer yehRATGCCGCCAGGACACTTGReverse Primer yehRTCTTCAACACCCGCGCATGTForward Primer wcaMGCCCTCCTCCCCTGTCAReverse Primer wcaMAATGGCAGAGGCGATTTGForward Primer nlpACGAACGATGCGACAGTGCGAAGAReverse Primer nlpACGAACGATGCGACAAATCATForward Primer pdCCGATGCTGCATTGCGTTGAReverse Primer pdCCGACGATGTCGATTGCGForward Primer pdCCGACGATGTCGACAAATCATForward Primer ynfCAAACAGCCTTCTTCGGACAAAReverse Primer ynfCTGAGCAAGGTGAAGTGACGAAReverse Primer ynfCGAGACTGCGGCGGAATAGCReverse Primer ynfCGAGACTGCGGCGGAATAGCReverse Primer ydcKGCTCCTCGCCGCTTATGGCGACACGATForward Primer ydcKCCTTTGATGGCGACACGATForward Primer rstAGTGCACTGATTGCCGCATACReverse Primer rstBCAGGGGTTCACGGTAACForward Primer rstBCGAGGCGAACAAAAGGTTCAReverse Primer rstBCGAGGCGAACGCCTTTReverse Primer rstAGCGGGGCTAAAGGTTCAReverse Primer rstBCAGGGGATCGCCCATACReverse Primer rstBCAGGGGAACAAAAGGTTCAReverse Primer rstBCAGGGCGAACAAAAGGTTCAReverse Primer rstBCAGGGCGAACACAAAAGGTTCAReverse Primer rstBCAGGGCGAACCACAAAGGTTCAReverse Primer rstBCAGGGCGAACCACAGACCCCTTTReverse Primer rstBCGAGGCGAACCACAGGTTCAReverse Primer rstBCGAGGCGAACCACAGGTTCAReverse Primer rstBCAGGGCGACCACGCTTTReverse Primer rstACGGCGGCTTAACGGTTCATGACGCTTC <td>Forward Primer marB</td> <td>AGGGCGTTGCGGAACA</td>	Forward Primer marB	AGGGCGTTGCGGAACA
Forward Primer yehRATGCCGCCAGGACACTTGReverse Primer yehRTCTTCAACACCCGCGATGTForward Primer wcaMGCCCTCCTCCCCTGTCAReverse Primer wcaMAATGGCAGAGGGCGATTTGForward Primer nlpAAAAGGGTCGATGCGGAAGAReverse Primer nlpACGAACGATGCGACAAATCATForward Primer ppdCCGATGTCTGCATTCGGTTGAReverse Primer pnfCCGACGCGATTTCGForward Primer ynfCAAAACGCCTTCTTCCGATAGAGAGAAAAReverse Primer ynfCGAGACGAGGGGAAAAGCAReverse Primer ynfCGAGACTGCGGCGGATAGCReverse Primer ynfCGAGACTGCGGCGGAATAGCReverse Primer ynfCGAGACTGCGGCGGAATAGCReverse Primer ynfCGAGACTGCGGCGGAATAGCReverse Primer ynfCGCGCTCTCCGCGCGGAATAGCReverse Primer ynfCGGCGCTCTACGGTCATTGGForward Primer ynfCGGCGGTCATCGCGCGAATAGCForward Primer ynfCGGCGGCTCTACGGTAATGACTForward Primer ynfCGTGCACTGATTGCCGCATACReverse Primer ynfCGTGCACTGATTGCCGCATACReverse Primer ynfCGCGCGGCTCTACGGTAACForward Primer rstAGCGCGGCTCTACGGTAACForward Primer rstBCAGGGATTGCCCCAGAAAReverse Primer rstBCAGGGCAACAAAAGGTTCAForward Primer ittcAACTGCTGACAGGACACGCTTTReverse Primer rttBGGCGGTTAAACGGTCATGAReverse Primer rttBGGCGGTTAAACGGTCATGAReverse Primer rttCAGGCGGTTAAACGGTCATGAReverse Primer rttCAGGCGGTTAAACGGTCATGAReverse Primer tucAGGCGGTTAAACGGTCATGAReverse Primer tucAGGCGGTTAAACGGTCATGARever	Reverse Primer marB	CGACATTGCCACAGGAAGTAAC
Reverse Primer yehRTCTTCAACACCCGCGATGTForward Primer wcaMGCCCTCCTCCCCTGTCAReverse Primer wcaMAATGGCAGAGGGCGATTTGForward Primer nlpAAAAGGGTCGAAGAGReverse Primer nlpACGAACGATGCGGACAAATCATForward Primer ppdCCGCATGTGCGATCGGTGAAReverse Primer ppdCCTGCGCGCGATTTCGForward Primer ynfCAAAACAGCCTTCTTCCGACAAAReverse Primer ynfCCAGACGTGGGACAAATGAGReverse Primer ynfCGAGACTGCGGCGAATAGCReverse Primer ynfCGAGACTGCGGCGAATAGCReverse Primer yccTGAGACTGCGGCGAATAGCReverse Primer yccTGAGTGACGCGGCATAGCReverse Primer ydcKCCTTTGATGGCGACACGATForward Primer rstAGTGCACTGATTGCCGCATACReverse Primer rstBCAGGGATTGCCCCCGAAAReverse Primer rstBCGAGGCGAACACAAAReverse Primer rstBCGAGGCGAACACAAAAGGTTCAReverse Primer rstBCGAGGCGAACACAAAAGGTTCAReverse Primer rstAGCGCGGCAACACAAAAGGTTCAReverse Primer rstBCAGGGATTGCCCCAGAAAReverse Primer rstBCGAGGCGAACAAAAGGTTCAReverse Primer rstBCGAGGCGAACAAAAGGTTCAReverse Primer rstBCGAGGCGAACAAAAGGTTCAReverse Primer rstBCGAGGCGAACACACGCTTTReverse Primer rstBCGAGGCGAACACACGCTTTReverse Primer rstBCGAGGCGAACACAGGTTCAReverse Primer rstBCGAGGCGACACACGCTTTReverse Primer rstCACGCGCGTTAACGGTTCATGAReverse Primer rstCACGCGCGTTAACGCTCACGACGCTTTReverse Primer rstCACGCGCGTTAACGGTTCATGAReverse P	Forward Primer yehR	ATGCCGCCAGGACACTTG
Forward Primer wcaMGCCCTCCTCCCCTGTCAReverse Primer wcaMAATGGCAGAGGGCGATTTGForward Primer nlpAAAAGGGTCGACAAGCAReverse Primer nlpACGAACGATGCGGACAATCATForward Primer ppdCCGATGTTGGCATTCGGTTGAReverse Primer ppdCCTGCGCGCGGATTTCGForward Primer ynfCAAAACAGCCTTCTTCCGACAAAReverse Primer ynfCGAGACTGCGGCGGAATAGCReverse Primer ynfCGAGACTGCGGCGGAATAGCReverse Primer yccTGAGACTGCGGCGGAATAGCReverse Primer yccTAGATGACAGTTAGACTReverse Primer ydKCCTTTGATGCGCACACGATReverse Primer ydKCCTTTGATGCGCGCATACReverse Primer rstAGTGCACTGATTGCCGCATACReverse Primer rstBCGAGGCGAACAAGGTTCAReverse Primer rstBCGAGGCGAACAGGTTCAReverse Primer rstAGGCGGTAACAGGTTCAReverse Primer rstACGAGGCGAACAGATCAReverse Primer rstBCGAGGCGAACAAAGGTTCAReverse Primer rstBCGAGGCGAACAAAGGTTCAReverse Primer rstAGGCGGGTAACAGGATCAReverse Primer rstBCGAGGCGAACAAAAGGTTCAAReverse Primer iucAGCGCGGTAAACGGTTCATGAReverse Primer iucAGCGCGGTAAACGGTTCATGAReverse Primer iucAGCGCGGTTAACGGTTCATGAReverse Primer iucA <td>Reverse Primer vehR</td> <td>TCTTCAACACCCCGCGATGT</td>	Reverse Primer vehR	TCTTCAACACCCCGCGATGT
Reverse Primer wcaMAATGGCAGAGGGCGATTTGForward Primer nlpAAAAGGGTCGATGCTGGAAGAReverse Primer nlpACGAACGATGCGACAAATCATForward Primer ppdCCGATGTCTGCATTCGGTTGAReverse Primer ppdCCTGCGCGCGATTTCGForward Primer ynfCAAAACAGCGCTTCTCCGACAAAReverse Primer ynfCGAGACTGCGGCGGAATAGCForward Primer ynfCGAGACTGCGGCGGAATAGCReverse Primer ynfCGAGACTGCGGCGGAATAGCReverse Primer ynfCGCTCCTCGCGCGTTAATGACTForward Primer ydcKGCTCCTCGCCGTTAATGACTReverse Primer ydcKGCGCGGCTCTACGCAAACReverse Primer rstAGTGCACTGATTGCCGCATACReverse Primer rstBCAGGGGAACAAAGGTTCAAReverse Primer stBCGGCGGCAAAAAGGTTCAForward Primer stBCGAGGCGAACAAAAGGTTCAForward Primer stAGCGCGGCTAAACGCCTTTReverse Primer stACGGCGGACACAGAAAReverse Primer stBCGAGGCGAACAAAAGGTTCAForward Primer iucAACTGCTGACAGGACACGCTTTReverse Primer stBCGAGGCGAACAAAAGGTTCAForward Primer iucAGCGCGGTTAAACGGTTCATGAForward Primer iucAGCGCGGTTAAACGGTTCATGAForward Primer iucAGCGCGGTTAAACGGTTCATGAForward Primer iucAGCCGGTTAAACGGTTCATGAForward Primer iucAGCGCGGTTAAACGGTTCATGA	Forward Primer wcaM	GCCCTCCTCCCCTGTCA
Forward Primer nlpAAAAGGGTCGATGCTGGAAGAReverse Primer nlpACGAACGATGCGACAAATCATForward Primer ppdCCGATGTCTGCATTCGGTTGAReverse Primer ppdCCTGCGCGCGACAATCATForward Primer ynfCAAAACAGCTTCTCCGACAAAReverse Primer ynfCGAGACTGCGGCGGAATAGCForward Primer ynfCGAGACTGCGGCGGAATAGCReverse Primer yncTGAGACTGCGGCGGAATAGCReverse Primer yncTGAGACTGCGCGCGGTTAATGACTForward Primer ydcKGCTCCTCGCCGTTAATGACTReverse Primer ydcKCCTTTGATGGCGACACGATForward Primer rstAGTGCACTGATTGCCGCATACReverse Primer rstBCAGGGATTGCCCCAGAAAReverse Primer rstBCGAGCGGAACAAAAGGTTCAReverse Primer rstACGAGGCGAACAAAAGGTTCAReverse Primer rstACGAGGCGAACAAAAGGTTCAReverse Primer rstBCGAGGCGAACAAAAGGTTCAReverse Primer rstBCGAGGCGAACAAAAGGTTCAReverse Primer rstACGAGGCGAACAAAAGGTTCAReverse Primer rstACGAGGCGAACAAAAGGTTCAReverse Primer rstBCGAGGCGAACAAAAGGTTCAReverse Primer rstBCGAGGCGAACAAAAGGTTCAReverse Primer iucAGCGGGTTAAACGGTTCATGAReverse Primer iucAGCGCGGTTAAACGGTTCATGAReverse Primer iucAGCCGGTTAAACGGTTCATGAReverse Primer iucAGCCGGTTAAACGGTTCATGA	Reverse Primer wcaM	AATGGCAGAGGGCGATTTG
Reverse Primer npACGAACGATGCGACAAATCATForward Primer ppdCCGATGTCTGCATTCGGTTGAReverse Primer ppdCCTGCGCGCGATTTCGForward Primer ynfCAAAACAGCCTTCTTCCGACAAAReverse Primer ynfCTGAGCAAGGTGAAGTGAGCGAAForward Primer ycCTGAGACTGCGGCGGAATAGCReverse Primer ycCXGCTCCTCGCCGTTAATGACTForward Primer ydcKGCTCCTCGCCGTTAATGACTForward Primer rstAGTGCACTGATTGCCGCATACReverse Primer rstBCGAGGATTGCCCCAGAAAReverse Primer rstBCGAGGCGAACAAAAGGTTCAReverse Primer rstAGCGCGGCTAAAGGCTCAReverse Primer rstACGAGGCGAACAAAAGGTTCAReverse Primer rstBCGAGGCGAACAAAAGGTTCAReverse Primer rstACGAGGCGAACAAAAGGTTCAReverse Primer rstACGAGGCGAACAAAAGGTTCAReverse Primer rstBCGAGGCGAACAAAAGGTTCAReverse Primer rstACGAGGCGAACAAAAGGTTCAReverse Primer rstACGAGGCGAACAAAAGGTTCAReverse Primer rstBCGAGGCGAACAAAAGGTTCAReverse Primer rstBCGAGGCGAACAAAAGGTTCAReverse Primer iucAGCGCGGTTAAACGGTTCATGAReverse Primer iucAGCCGGTTAAACGGTTCATGAReverse Primer iucAGCCGGTTAAACGGTTCATGAReverse Primer iucAGCCGGTTAACGGTTCATGAReverse Primer iucAGCCGGTTAACGGTTCATGAReverse Primer iucAGCCGGTTAACGGTTCATGAReverse Primer iucAGCCGGTTAACGGTTCATGAReverse Primer iucAGCCGGTTAACGGTTCATGAReverse Primer iucAGCCGGTTAACGGTTCATGAReverse Primer iucAGCCGGTTAACGGTTCATGA <t< td=""><td>Forward Primer nlpA</td><td>AAAGGGTCGATGCTGGAAGA</td></t<>	Forward Primer nlpA	AAAGGGTCGATGCTGGAAGA
Forward Primer pdCCGATGTCTGCATTCGGTTGAReverse Primer pdCCTGCGCGCGATTTCGForward Primer ynfCAAAACAGCCTTCTTCCGACAAAReverse Primer ynfCTGAGCAAGGTGAAGTGACGAAForward Primer ycCTGAGACTGCGGCGGAATAGCReverse Primer ycCKGCTCCTCGCCGTTAATGACTForward Primer ydcKGCTCCTCGCCGTAATGACCAGATForward Primer rstAGTGCACTGATTGCCGCATACReverse Primer rstBCGAGGATTGCCCCAGAAAReverse Primer rstBCGAGGCGAACAAAAGGTTCAReverse Primer rstAGCGCGGCAACAGAACAAAAGGTTCAReverse Primer rstACGAGGCGAACAAAAGGTTCAReverse Primer rstBCGAGGCGAACAAAAGGTTCAReverse Primer rstAGCGCGGCTAATAGACCAGATReverse Primer rstACGAGGCGAACAAAAGGTTCAReverse Primer rstBCGAGGCGAACAAAAGGTTCAReverse Primer rstACGAGGCGAACAAAAGGTTCAReverse Primer rstAGCGGGTTAAACGGTTCAAReverse Primer rstBCGAGGCGAACAAAAGGTTCAReverse Primer iucAGCGCGTTAAACGGTTCATGAReverse Primer iucAGCCGGTTAAACGGTTCATGA	Reverse Primer <i>nlpA</i>	CGAACGATGCGACAAATCAT
Reverse Primer phCCTGCGCGCGATTTCGForward Primer ynfCAAAACAGCCTTCTTCCGACAAAReverse Primer ynfCTGAGCAAGGTGAAGTGACGAAForward Primer yccTGAGACTGCGGGGAATAGCReverse Primer ydcKGCTCCTCGCCGTTAATGACTReverse Primer ydcKCCTTTGATGGCGACACGATForward Primer rstAGTGCACTGATTGCCGCATACReverse Primer rstBCGAGGGTCACAGGAAAReverse Primer rstBCGAGGCGAAAAAGGTTCAReverse Primer rstAGCGCGGAAAAAGGTTCAReverse Primer rstAGCGCGGCACACAGAAAReverse Primer rstBCGAGGCGAACAAAAGGTTCAReverse Primer rstAGCGCGGCTAACGGCAACAAAAGGTTCAReverse Primer rstAGCGCGGCGAACAAAAGGTTCAReverse Primer rstBCGAGGCGAACAAAAGGTTCAReverse Primer iucAGCGCGGTTAAACGGTTCATGA	Forward Primer ppdC	CGATGTCTGCATTCGGTTGA
Forward Primer ynfCAAAACAGCCTTCTTCCGACAAAReverse Primer ynfCTGAGCAAGGTGAAGTGACGAAForward Primer ycCTGAGACTGCCGGCGGAATAGCReverse Primer yccTAGATGACAGTACGCTGCTTTCGForward Primer ydcKGCTCCTCGCCGTTAATGACTReverse Primer ydcKCCTTTGATGGCGACACGATForward Primer rstAGTGCACTGATTGCCGCATACReverse Primer rstBCAGGGGATTGCCCCAGAAAReverse Primer rstBCGAGGCGAACAAAAGGTTCAForward Primer rstBCGAGGCGAACAGAATCAForward Primer rstBCGAGGCGAACAAAAGGTTCAForward Primer iucAACTGCTGACAGGACACGCTTTReverse Primer iucAGCGCGGTTAAACGGTTCATGA	Reverse Primer ppdC	CTGCGCGCGATTTCG
Reverse Primer ynfCTGAGCAAGGTGAAGTGACGAAForward Primer yccTGAGACTGCGGCGGGAATAGCReverse Primer yccTAGATGACAGTACGCTGCTTTCGForward Primer ydcKGCTCCTCGCCGTTAATGACTReverse Primer ydcKCCTTTGATGGCGCACACGATForward Primer rstAGTGCACTGATTGCCGCATACReverse Primer rstBCAGGGATTGCCCCAGAAAReverse Primer rstBCGAGGCGAACAAAAGGTTCAForward Primer iucAACTGCTGACAGGACACGCTTTReverse Primer iucAGCGCGGTTAAACGGTTCATGA	Forward Primer vnfC	AAAACAGCCTTCTTCCGACAAA
Forward Primer yccTGAGACTGCGGCGGAATAGCReverse Primer yccTAGATGACAGTACGCTGCTTTCGForward Primer ydcKGCTCCTCGCCGTTAATGACTReverse Primer ydcKCCTTTGATGGCGACACGATForward Primer rstAGTGCACTGATTGCCGCATAACReverse Primer rstBCAGGGATTGCCCAGAAAReverse Primer rstBCGAGGCGAACAAAAGGTTCAForward Primer iucAACTGCTGACAGGACACGCTTTReverse Primer iucAGGCGGGTTAAACGGTTCATGA	Reverse Primer vnfC	TGAGCAAGGTGAAGTGACGAA
Reverse Primer yccTAGATGACAGTACGCTGCTTTCGForward Primer ydcKGCTCCTCGCCGTTAATGACTReverse Primer ydcKCCTTTGATGGCGACACGATForward Primer rstAGTGCACTGATTGCCGCATACReverse Primer rstAGCGCGGCTCTACGGTAACForward Primer rstBCAGGGATTGCCCCAGAAAReverse Primer rstBCGAGGCGACACGACTACForward Primer rstBCGGCGGCCACCAGGACAAAAGGTTCAForward Primer iucAACTGCTGACAGGACACGCTTTReverse Primer iucAGGCGGTTAAACGGTTCATGA	Forward Primer $vccT$	GAGACTGCGGCGGAATAGC
Forward Primer ydcKGCTCCTCGCCGTTAATGACTReverse Primer ydcKCCTTTGATGGCGACACGATForward Primer rstAGTGCACTGATTGCCGCATACReverse Primer rstAGCGCGGCTCTACGGTAACForward Primer rstBCAGGGATTGCCCAGAAAReverse Primer rstBCGAGGCGAACAAAAGGTTCAForward Primer iucAACTGCTGACAGGACACGACTTTReverse Primer iucAGGCGGTTAAACGGTTCATGA	Reverse Primer yccT	AGATGACAGTACGCTGCTTTCG
Reverse Primer ydcKCCTTTGATGGCGACACGATForward Primer rstAGTGCACTGATTGCCGCATACReverse Primer rstAGCGCGGCTCTACGGTAACForward Primer rstBCAGGGATTGCCCCAGAAAReverse Primer rstBCGAGGCGAACAAAAGGTTCAForward Primer iucAACTGCTGACAGGACACGCTTTReverse Primer iucAGGCGGTTAAACGGTTCATGA	Forward Primer vdcK	GCTCCTCGCCGTTAATGACT
Forward Primer rstAGTGCACTGATTGCCGCATACReverse Primer rstAGCGCGGCTCTACGGTAACForward Primer rstBCAGGGATTGCCCCAGAAAReverse Primer rstBCGAGGCGAACAAAAGGTTCAForward Primer iucAACTGCTGACAGGACACGCTTTReverse Primer iucAGGCGGTTAAACGGTTCATGA	Reverse Primer vdcK	CCTTTGATGGCGACACGAT
Reverse Primer rstAGCGCGGCTCTACGGTAACForward Primer rstBCAGGGATTGCCCCAGAAAReverse Primer rstBCGAGGCGAACAAAAGGTTCAForward Primer iucAACTGCTGACAGGACACGCTTTReverse Primer iucAGGCGGTTAAACGGTTCATGA	Forward Primer <i>rstA</i>	GTGCACTGATTGCCGCATAC
Forward Primer rstB CAGGGATTGCCCCAGAAA Reverse Primer rstB CGAGGCGAACAAAAGGTTCA Forward Primer iucA ACTGCTGACAGGACACGCTTT Reverse Primer iucA GGCGGTTAAACGGTTCATGA	Reverse Primer <i>rstA</i>	GCGCGGCTCTACGGTAAC
Reverse Primer <i>rstB</i> CGAGGCGAACAAAAGGTTCA Forward Primer <i>iucA</i> ACTGCTGACAGGACACGCTTT Reverse Primer <i>iucA</i> GGCGGTTAAACGGTTCATGA	Forward Primer <i>rstB</i>	CAGGGATTGCCCCAGAAA
Forward Primer iucA ACTGCTGACAGGACACGCTTT Reverse Primer iucA GGCGGTTAAACGGTTCATGA	Reverse Primer <i>rstB</i>	CGAGGCGAACAAAGGTTCA
Reverse Primer <i>iucA</i> GGCGGTTAAACGGTTCATGA	Forward Primer iucA	ACTGCTGACAGGACACGCTTT
	Reverse Primer iucA	GGCGGTTAAACGGTTCATGA

Bold italic letters indicate restriction enzymes sites in the complement primer.

the fact that this gene appears to be under positive selection pressure suggested that *yicS* may be associated with the pathogenicity of APEC strains.

To better understand the role of yicS protein in APEC biological

characteristics and pathogenicity, we deleted *yicS* in an APEC Swollen Head Syndrome strain (APEC strain SCI-07) (de Paiva et al., 2015b; Verma et al., 2015) and studied its effects by comparing wild type and isogenic mutants through comprehensive *in vitro* and *in vivo* assays. Download English Version:

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