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## **Supplemental information**

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#### Supplementary Information

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#### **Transparent Methods**

#### **Bacterial Strains, Plasmids, and Culture Conditions**

Table S1 lists the strains and plasmids used or produced in this study. *Escherichia coli* JM109 was used for plasmid preparation. The *E. coli* JM109 transformants carrying plasmids based on pHY-PLK300, were selected on Luria–Bertani (LB) agar plates supplemented with ampicillin (100 µg/mL). The *B. licheniformis* B1391 transformants were selected on LB agar plates supplemented with tetracycline (20 µg/mL). Two strains were cultured in LB medium (10 g/L tryptone, 5 g/L yeast extract, 10 g/L NaCl), *E. coli* was cultured at 37 °C and 200 rpm, and *B. licheniformis* was cultured at 37 °C and 250 rpm. Fermentation medium (12 g/L tryptone, 24 g/L yeast extract, 16.427 g/L K<sub>2</sub>HPO<sub>4</sub>.3H<sub>2</sub>O, 2.31 g/L KH<sub>2</sub>PO<sub>4</sub>) was prepared for protein expression. A 3% seed liquid was inoculated into the fermentation medium, and batch fermentation was cultured at 37 °C and 250 rpm.

#### **Plasmid Construction**

The recombinant plasmids were constructed based on pHY300-PLK using the primers listed in Table S2. First, eGFP was amplified by the primer pair eGFP-F/eGFP-R (Table S2). The fragment was then purified and digested with *Xho*I and *Sma*I, followed by incorporation into pHY300-PLK, yielding pE. Then, the promoter region, *PtreA*, was cloned using 100 ng of the genome of *Bacillus licheniformis* CICIM B1391. PCR was performed with high-fidelity DNA polymerase (Vazyme Biotech Co., Ltd. 2 × Phanta Master Mix) and the primer pairs *PtreA*-F/*PtreA*-R. The fragment was also purified and digested with *Hin*dIII and *Xho*I, followed by incorporation into pE, yielding pBLTE. Next, the artificial promoter *PtreA* was constructed using overlap extension PCR. Two fragments, *PtreA*-CRETre-1 and *PtreA*-CRETre-2, were cloned by the primer pairs *PtreA*-F/*PtreA*-CRETre-R, *PtreA*-CRETre-F/*PtreA*-R, using *PtreA* as template. *PtreA*-CRETre was created using *PtreA*-CRETre-1 and *PtreA*-CRETre-2 as a template, and *PtreA*-F/*PtreA*-R as primers. The fragment *PtreA*-CRETre was also purified and digested with *Hin*dIII and *Xho*I, followed by incorporation method of pBLT1E.

#### Transformation of B. licheniformis

A method of electrotransformation was used to transform plasmids into *B. licheniformis*. A total of 8 µg-10 µg of plasmid was added to the *B. licheniformis* competent cells and mixed. Then, the mixed competent cells were added to a precooled 0.1 cm Gene Pulser cuvette and placed on ice for 5 min. Next, the 0.1 cm Gene Pulser cuvette was placed into an electroporation apparatus and shocked with 2,100 V. After the electric shock was administered, 900 µL of recovery medium (LB + 0.5 M sorbitol + 0.38 M mannitol) was immediately added, and the cells were cultured at 37°C and 100 rpm for 3 h before being applied to the corresponding antibiotic plates.

#### Fluorescence Measurement of eGFP

The BlspTE strain was cultured overnight at 37°C and 250 rpm, and 3% culture was inoculated into the fermentation broth. After 8 h of growth, 15 g/L trehalose was added for inducible expression. The sample was measured for OD600 and fluorescence intensity after 16 h of adding trehalose. Then, 100  $\mu$ L of fermentation broth was centrifuged to obtain the cell pellet, then the cell pellet was rinsed twice with phosphate buffered saline (PBS) solution at pH 7.4, and the final OD600 was diluted to 0.5. Next, 200  $\mu$ L of diluted suspension was added to the 96-well microtiter plate (Corning). The 96-well microtiter plate was placed in a TECAN-SparK plate reader (Tecan, Männedorf, Switzerland), which calculated the final value using an absorption wavelength of 485 nm, excitation wavelength of 535 nm, and gain value of 100. The formula FI (AU/OD) = 2×(FVt-FVr), where FVt refers to the fluorescence value measured by the target strain, and FVr represents the fluorescence value measured by the control strain BlsPE, was used to evaluate the fluorescence intensity.

#### **Electrophoretic Mobility Shift Assays**

DNA probes were amplified using high-fidelity DNA polymerase (Vazyme Biotech Co., Ltd. 2 × Phanta Master Mix) and primers were labeled with biotin. Biotin-labeled probes were purified by agarose gel electrophoresis. 10 nM biotin-labeled probes were incubated with different concentrations of CcpA in binding buffer (10 mM Tris-HCI (pH 7.4), 1 mM DTT, 1 mM EDTA, 50 mM KCI, 0.05 µg/µL poly (dI-dC), 1 mM MgCl<sub>2</sub>), and the reaction solution was put through a full reaction at 25°C for 20 min. After the reaction was completed, the samples were separated by electrophoresis using 4% acrylamide gels in 0.5 × Tris-borate EDTA (TBE) buffer. The samples were electroblotted from the acrylamide gels onto nylon membrane (Beyotime, FFN15), and immobilized by UV crosslinking. The nylon membrane was washed and detected using Chemiluminescent EMSA Kit (Beyotime, GS009) according to manufacturing protocol. Gel imaging and analysis were performed using ChemiDoc XRS (Bio-Rad, U.S.A).

#### Statistical analysis

The sample size was  $n \ge 3$  for biology experiments. A student's tests (\* $P \le 0.05$ ; \*\* $P \le 0.01$ , \*\*\* $P \le 0.001$ ) were performed for statistical analysis.



Figure S1: EMSA of CcpA or CcpA-Hpr-P protein for fragment A and B. Related to Figure 1.

The *hpr* (c16360) gene of *Bacillus licheniformis* CICIM B1391 was cloned and then inserted into pET28a vector (between *Nde*I and *Eco*RI), to obtain the gene expression vector of pET28a-*hpr*. The recombinant strain *E.coli* BL21 (DE3) containing expression vector was grown overnight in 15 mL LB-Kanamycin at  $37^{\circ}$ C, 200 rpm. A 3 % of the culture was inoculated into Terrific Broth (TB) at  $37^{\circ}$ C until OD600 of 0.4-0.5. The Hpr protein was induced by 0.1mM IPTG for 10 h at  $25^{\circ}$ C. The cells were collected by centrifugation at 8,000 × g for 5 min. The Hpr protein was purified by the Kit (Mag-Beads His-Tag Protein Purification, Sangon Biotech, C650033) according to the manufacture's protocols. The purify of the Hpr Protein was analyzed through Tris-Tricine SDS PAGE.

Hpr protein phosphorylation was performed in 20 mM Tris-Cl buffer (pH 7.0) supplemented with 1 mM MgCl<sub>2</sub>, 2 mM NaCl and 5 mM ATP. 27  $\mu$ g Hpr protein and 0.15  $\mu$ g HprK protein was added to the reaction system at 37 °C for 10 min. The reaction was ended at 75 °C for 5 min. 10% phos-tag SDS PAGE (Boppard, 193-16711) was used to determine whether Hpr phosphorylation.

The EMSA Lane (left→right): 10 nM fragment A; 1.2µM CcpA+10 nM fragment A; 1.2 µM CcpA +1.2 µM Hpr-P+10 nM fragment A; 1.2µM CcpA+10 nM fragment B; 1.2 µM CcpA +1.2 µM Hpr-P+10 nM fragment B; 1.2µM CcpA + 10 nM Positive control probe.



Figure S2: EMSA of CcpA protein binding to two fragments (E6, E7) labelled with 5'-biotin. Related to Figure 1.

Fragment E6 and Fragment E7, containing cre4-1 (AGCGTT-aaggaactttcaga-AACGCT) and cre4-2 (AGCTTT-aaggaactttcaga-AAAGCT). Increasing concentrations of CcpA (0 μM, 0.6 μM, 0.9 μM, 1.2 μM) were incubated with 10 nM E6 or E7 before the reaction run on EMSA gel.

L: 1	2	3	4	5	6	х	7	8	9	10	11	12	R CcpA-His(µM)	0 2.0 2.0 2.0 2.0 2.0 2.0
TO A	G	с	т	т	т	AAGGAACTTTCAGA	А	А	Α	G	С	т	]	
T1-1 C	G	С	т	т	т	AAGGAACTTTCAGA	А	А	Α	G	с	G		副目前のたい
T2-1 A	т	С	т	т	т	AAGGAACTTTCAGA	Α	Α	Α	G	A	т		
T3-1 A	G	т	т	т	т	AAGGAACTTTCAGA	Α	Α	Α	A	С	т		
T4-1 A	G	С	С	т	т	AAGGAACTTTCAGA	Α	Α	G	G	С	т		
T5-1 A	G	С	т	С	т	AAGGAACTTTCAGA	Α	G	Α	G	С	т		T1-1 T1-1 T2-1 T3-1 T4-1 T5-1 T6-1
T6-1 A	G	С	т	т	C	AAGGAACTTTCAGA	G	Α	A	G	С	т	CcpA-His(uM)	0 2.0 2.0 2.0 2.0 2.0 2.0
T7-1 A	G	С	т	т	G	AAGGAACTTTCAGA	С	Α	A	G	С	т		
T8-1 A	G	с	т	G	т	AAGGAACTTTCAGA	Α	C	A	G	С	т		
T9-1A	G	С	G	т	т	AAGGAACTTTCAGA	Α	Α	C	G	С	т		
T10-1A	G	Α	т	т	т	AAGGAACTTTCAGA	Α	Α	A	т	С	т		
T11-1A	A	С	т	т	т	AAGGAACTTTCAGA	Α	Α	A	G	т	т		
T12-1G	G	С	т	т	т	AAGGAACTTTCAGA	Α	Α	A	G	С	С	-	T7 1 T7 1 T8 1 T9 1 T10 1 T11 1 T12 1

Figure S3: Nucleotide mutations within the 12-bp symmetrical regions of CRE<sub>Tre</sub>. Related to Figure 3.

Two symmetrical bases in symmetrical regions were mutated based on fragment H1, resulting 12 derivative probes (T1-1, T2-1, T3-1, T4-1, T5-1, T6-1, T7-1, T8-1, T9-1, T10-1, T11-1, and T12-1). 2.0  $\mu$ M CcpA was incubated with 10 nM T1-1, T2-1, T3-1, T4-1, T5-1, T6-1, T7-1, T8-1, T9-1, T10-1, T11-1, and T12-1before the reaction run on EMSA gel.

L: 1	2	3	4	5	6	Х	7	8	9	10	11	12	:R	CcpA-His(µM)	0	2.0	2.0	2.0	2.0	2.0	2.0
T <sub>R</sub> A	А	Α	G	С	Т	AAGGAACTTTCAGA	Α	G	С	т	т	Т	1								
T <sub>R1-1</sub> C	Α	А	G	с	т	AAGGAACTTTCAGA	Α	G	С	т	т	G							•		
T <sub>R2-1</sub> A	С	Α	G	С	т	AAGGAACTTTCAGA	Α	G	С	т	G	Т								••	
T <sub>R3-1</sub> A	Α	С	G	С	т	AAGGAACTTTCAGA	Α	G	С	G	т	Т			-	2	1	4	1	13	
Т <sub>R4-1</sub> А	Α	Α	т	С	т	AAGGAACTTTCAGA	Α	G	A	т	т	т			_			_	_	_	_
T <sub>R5-1</sub> A	Α	А	G	т	т	AAGGAACTTTCAGA	Α	Α	с	т	т	т			T <sub>R1</sub>	1 T <sub>R1-1</sub>	T <sub>R2-1</sub>	T <sub>R3-1</sub>	T <sub>R4-1</sub>	T <sub>R5-1</sub>	T <sub>R6-1</sub>
T <sub>R6-1</sub> A	Α	Α	G	С	С	AAGGAACTTTCAGA	G	G	с	т	т	т		CcpA-His(µM)	0	2.0	2.0	2.0	2.0	2.0	2.0
Т <sub>R7-1</sub> А	Α	А	G	С	G	AAGGAACTTTCAGA	С	G	С	т	т	т									
T <sub>R8-1</sub> A	Α	Α	G	A	т	AAGGAACTTTCAGA	А	т	С	т	т	т									
T <sub>R9-1</sub> A	А	Α	Α	С	т	AAGGAACTTTCAGA	Α	G	Т	т	т	т									
T <sub>R10-1</sub> A	Α	G	G	С	т	AAGGAACTTTCAGA	Α	G	С	С	т	т				-	-				
T <sub>R11-1</sub> A	G	Α	G	С	т	AAGGAACTTTCAGA	Α	G	С	т	С	т			_	-	_	_	-	-	_
T <sub>R12-1</sub> G	Α	Α	G	С	т	AAGGAACTTTCAGA	Α	G	С	т	т	С			TR	7-1 T <sub>R7</sub>	1 T <sub>R8</sub>	1 T <sub>R9</sub>	1TR10	T <sub>R11</sub>	-1T <sub>R12-1</sub>

Figure S4: Further point mutation of the 12-bp symmetrical region of CRE<sub>Tre(R)</sub>. Related to Figure 6.

Two symmetrical bases in symmetrical regions were mutated based on fragment H1, resulting 12 derivative probes (TR1-1, TR2-1, TR3-1, TR4-1, TR5-1, TR6-1, TR7-1, TR8-1, TR9-1, TR10-1, TR11-1, and TR12-1). 2.0 µM CcpA was incubated with 10 nM (TR1-1, TR2-1, TR3-1, TR4-1, TR5-1, TR6-1, TR7-1, TR8-1, TR9-1, TR10-1, TR11-1, and TR12-1), and T12-1before the reaction run on EMSA gel.





Figure S5: Potential CRE<sub>Tre</sub> sites in xylose operon and mannose operon. Related to Figure 8.

The putative CRE<sub>Tre</sub> was annotated with red. Increasing concentrations of CcpA (0 µM, 0.6 µM, 0.9 µM, 1.2 µM) were incubated with 10 nM fragments before the reaction run on EMSA gel.

Table S1Bacterial Strains and Plasmids Used in This Study. Related to Figure 4.

Strain or plasmid	Description		Reference		
Strains					
Escherichia coliJM109	F′, traD36, proAB + laclq, Δ(lacZ), M15/Δ (lac-proAB), gln V44, e14−, g recA1, relA1, endA1, thi, hsdR17 (CICIM B0012)	CICIM-CU			
Bacillus licheniformis	wild time (CICIM D4204)				
CICIM B1391	wild-type (CICIM B1391)	CICIM-CU			
Bacillus licheniformis CA	B. licheniformis CICIM B1391, $\Delta ccpA$		Laboratory construct		
BlspHY	B. licheniformis CICIM B1391, harboring pHY300-PLK		this work		
BlspE	B. licheniformis CICIM B1391, harboring pE		this work		
BlspTE	B. licheniformis CICIM B1391, harboring pBLTE		this work		
BlspT1E	B. licheniformis CICIM B1391, harboring pBLT1E		this work		
BlspT2E	B. licheniformis CICIM B1391, harboring pBLT2E		this work		
BlspDE	B. licheniformis CICIM B1391, harboring pBLDE		this work		
BlspAE	B. licheniformis CICIM B1391, harboring pBLAE		this work		
BlspHY1	B. licheniformis CA, harboring pHY300-PLK		this work		
BlspE1	B. licheniformis CA, harboring pE		this work		
BlspTE1	B. licheniformis CA, harboring pBLTE		this work		
BlspT1E1	B. licheniformis CA, harboring pBLT1E		this work		
BlspT2E1	B. licheniformis CA, harboring pBLT2E		this work		
BlspDE1	B. licheniformis CA, harboring pBLDE		this work		
BlspAE1	B. licheniformis CA, harboring pBLAE				
Plasmids			this work		
pMD18-T-simple	<i>E. coli</i> cloning vector, Ap <sup>R</sup>		TaKaRa		
pHY300-PLK	<i>E. coli/Bacillus</i> shuttle vector, Ap <sup>R</sup> /Tet <sup>R</sup>		TaKaRa		
pE	pHY300-PLK derivative with egfp		this work		
pBLTE	pE derivative with PtreA from B. licheniformis CICIM B1391	this work			
	pE derivative with P <i>treA,</i> in which CRE site 'TGAAAGCGCTATAA' v	was	this work		
pBLT1E	changed to 'AGCTTT-AT-AAAGCT'	this work			
	pE derivative with PtreA, in which CRE site 'TGAAAGCGCTATAA' w		this work		
pBLT2E	changed to 'AAAGCT-AT-AGCTTT'		this work		
pBLDE	pE derivative with PdnaP from B. licheniformis CICIM B1391		this work		
pBLAE	pE derivative with P5A2 from <i>B. licheniformis</i> CICIM B1391		this work		

Ap<sup>R</sup>, ampicillin resistance; Tet<sup>R</sup>, tetracycline resistance; Kan<sup>R</sup>, kanamycin resistance

CICIM-CU: Culture and Information Center of Industrial Microorganisms of China Universities.

Table S2

Primers Used to Construct Recombinant Plasmids. Related to Figure 4.

ofFPF     CCCCCCGGGUtaccoggggtoggit     Xhol       aGFPR     CCCCCCGGGUtaccoggggtoggit     Small       prex.F     CCCCCCGGGUtaccogggtoggit     Xhol       Prex.R     CCCCCCGGUtacctogggtoggit     Xhol       Prex.CRETror.F     AGCITTAIAACCCTaactagggtoggtoctult     Hindlil       Prex.CRETror.F     AAGCITAGGUTTaacatogggggggatca     Hindlil       Prex.CRETror.F     AAGCITAGGUTTaacatoggggggatca     Hindlil       Prex.CRETror.F     AAGCITAGGUTTaacatoggggatca     Hindlil       Prex.CRETror.F     AAGCITAGGUTTaacatogggatcatast     Hindlil       Prex.CRETror.F     CCCCAAGCITagggtaggattaactoctoctte     Xhol       Prex.PRETror.F     CCCCAAGCITagggtaggattaactoctoctte     Xhol       Prex.PRETror.F     aacagaatgggagattaactoctoctte     Xhol       IreR-195-F     tagagattaacagagtat     Hindlil       IreR-195-F     tagagagataggaggattaactoctoctte     Xhol       IreR-195-F     tagagagataggaggattaactoctoctte     Xhol       IreR-195-F     tagagatagaaggattaactoctoctoctoctoctoctoctoctoctoctoctoctoc	Primers	Sequence (5'-3')	Restriction site
eGFPR CCCCCCGSGerencequerginging Sine PreA-R CCCCTCCAC intersequerginging Sine PreA-RET CCCCCCAC intersequerginging Note PreA-RET CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC	eGFPF	CCGCTCGAG atgggtcgcggatccatg	Xhol
ProxAFFCCCAGCCT GardrageognitudeHindliProxACRETiveFCCCT CGAGUCGAGUCGALCUCIDICXholProxACRETiveFAGCTTTATAAACCT analatuguaCucturgiXholProxACRETiveFFAGCTTATAAACCT analatuguaCucturgiXholProxACRETiveFFAGCTTATAAACCT analatuguaCucturgiXholProxACRETiveFFAAGCTATAGCTT analatuguaCucturgiXholProxACRETiveFFCCCAACCT CongUt analatuguaCucturgiXholProxACRETiveFFCCCAACCT CongUt analatuguaCucturgiXholPohaPFCCCCAACCT CongUt analatuguaCucturgiXholPohaPFCCCCAACCT CongUt analatuguaCucturgiXholPohaPFCCCCAACCT CongUt analatuguaCucturgiXholVireF109FatacqanticoggancaacatXholVireF109FqagaacaacaataCaacaacaatXholVireF109FgagacaacaagitatVireF109FVireF109FgagacaacaagitatVireF109FVireF109FgagacaacagitatVireF109FVireF109FgagacaacagitatVireF109FVireF109FgagacaacagitatVireF109FVireF109FgagacaacagitagaacagitatVireF109FVireF100FtugagacacagitagaVireF109FVireF100FtugagaccacaattictagaVireF109FVireF100FgagaccacaattictagaVireF109FVireF100FgagaccacaattictagaCuttigVireF109FVireF100FtugagaccacaattictagaCuttigVireF109FVireF100FgagaccacaattictagaCuttigVireF109FVireF100FtugagaccacaattictagaCuttigVireF109FVireF100Ftuga	eGFPR	TCC <u>CCCGGG</u> tcacacgtggtggtggtg	Smal
ProvARCCGCCCAGUECAGUECAGUECAGUECAGUECAGUECAGUE	P <i>treA</i> -F	CCCAAGCTTatctcagccggttgttcc	<i>Hin</i> dIII
Pre#-CRETIVEF     AGCITIAIAAGCI anasing inpactacity       Pre#-CRETIVER,F     AGCITIAIAAGCI anasing inpactacity       Pre#-CRETIVER,F     AGCITIAGCITI analatity inpactacity       Pre#-CRETIVER,F     AGCITIAGCITI analatity inpactacity       Pre#-CRETIVER,F     AGCITIAGCITI analatity inpactacity       Pre#-CRETIVER,F     CCCAGCIT anggeogggaga analatal       Pre#-RETIVER,F     CCCAGCIT anggeogggaga analatal       PSA2.F     CCCAGCIT anggeogggaga analatal       PSA2.F     CCCAGCIT anggeogggaga analatal       PSA2.F     CCCAGCIT anggeogggaga analatal       PRF109F.F     anaga analaticog anacaanal       PRF109F.F     gaanacaanaticog anacaana       PRF200F.F     gaanacaanaticog anacaana       PRF200F.F     gaanacaanaticog anacaana <td>P<i>treA</i>-R</td> <td>CCGCTCGAGttccaatccctccttctc</td> <td>Xhol</td>	P <i>treA</i> -R	CCGCTCGAGttccaatccctccttctc	Xhol
Pre-AcRETro(R)-FAdSCITA/AcGCITasatasaasagocoggPre-AcRETro(R)-FAAAGCIA/AGCITasatasaasagocoggPre-AcRETro(R)-FCCCAAGCITasatasaasagocoggPdm-PACCCCAGCIGAGocoggocigaacactatataKindliKindliPSA2-RCCCCAGCIGAGOcoggocigaacactatataWarNiga-FatgaagatcacaagtatatWarNiga-FatgaagatcacaagtatatWarNiga-FasacaattgaagataWarNiga-FgaaagagocotigooggaaWarNiga-FgaaagagocotigooggaaWarNiga-FgaaagagocotigooggaaWarNiga-FtagaagatcacaagtatatWarNiga-FgaaagagocotigooggaaWarNiga-FtogaoggaaggataWarNiga-FtogaoggaaggataWarNiga-FtogaoggaaggataWarNiga-FtogaoggaaggataWarNiga-FtogaoggaaggataWarNiga-FtogaogtacoggagaWarNiga-FcogattcoggttggaWarNiga-FcogattcoggttggaWarNiga-FcogattcoggttggaWarNiga-FcogattcoggttggaWarNiga-FcogattcoggttggaWarNiga-FcogattcoggttggaWarNiga-FcogattcoggttggaWarNiga-FcogattcoggttggaWarNiga-FcogattcoggttggaWarNiga-FcogattcoggttggaWarNiga-FcogattcoggttggaWarNiga-FcogattcoggttggaWarNiga-FcogattcoggttggaWarNiga-FcogattcoggttggaWarNiga-FcogattcoggttggaWarNiga-FcogattcoggttggaWarNiga-FcogattcoggttggaWarNiga-Fcogattcoggttgga <tr< td=""><td>PtreA-CRETre-F</td><td>AGCTTTATAAAGCTaaatatgttgactacttgt</td><td></td></tr<>	PtreA-CRETre-F	AGCTTTATAAAGCTaaatatgttgactacttgt	
Pre4-CRETre(R)-F     AAAGCTATAGCTTTasaatagttgadtatigt       Pre4-CRETre(R)-R     AAAGCTATAGCTTTasaatagttgagtaggags     HirdIII       Pre4-R     CCGCTCQAGcgoctgaacaatastaata     Xhol       PdmP-R     CCGCTCQAGcgoctgaacatastaat     Xhol       PdmP-R     CCGCTCQAGcgoctgaacatastaat     HirdIII       PSA2-F     CCGCTCGAGctaggatttacccocttte     Xhol       reR-109-F     atgaagttcaacaagtatt     HirdIII       PSA2-R     CCGCTCGAGctaggatttacccocttte     Xhol       reR-109-F     atgaagttcaacaagtatt     HirdIII       reR-109-F     atgaagttcaacagtat     HirdIII       reR-109-F     atgaagttcaacagtatt     HirdIII       reR-109-F     gattcaacagttagta     HirdIII       reR-109-F     gattcaacgttagtat     HirdIII       reR-102-F     gattcaacgttagtat     HirdIII       reR-102-F     gattcaacgttagtat     HirdIII       reR-102-F     gattcaacgttagtatagtagtagtagt     HirdIIII       reR-102-F     gattcaacgttagtatagtagt     HirdIIII       reR-102-F     gattcaacgttagtatagt     HirdIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	PtreA-CRETre-R		
Prod-CRETre(R)-RAMAGCTATAGCTT asaataaaaaaagacceggHirdIIIPdmP-FCCCQAGCTGAGCGGgggctggacqatcgaHirdIIIPGAP-FCCCCAGCTGAGCGGgggctggacqatcatataXholPGAP-FCCCCAGCTGAGCGGgggacqatcatataXholPGAP-FcCCCAGCTGAGCGGgggacqatcatataXholPGAP-FatgaagatcaacagatatatViceIIIIVerR-199-FatgaagatcaacagatatatViceIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	PtreA-CRETre(R)-F	AAAGCTATAGCTTTaaatatgttgactacttgt	
PdmPARCCCAAGCITacgetaggaggaggaggaggaggaggaggaggaggaggaggagg	PtreA-CRETre(R)-R		
PdnaP-RCCGCTGAGcggcgtgaacettataXholPSA2-RCCGCAGCaGycgcggaacettataXholPSA2-RCCGCTGCAGYcggagtagattatetXholref-199-FatagaagtacacagtataXholref-199-FaaacaastagcagaacaatXholref-199-FgaacagattgagaacaagtataIntellingref-199-FgaacagattgagaacaatIntellingref-199-FgaacagattgagaacaatIntellingref-199-FtatagagaacaggatIntellingref-199-FtatagagaacaggaIntellingref-199-FtagagaacaggaacaggatIntellingref-192-FtagtacaaggaacaggatIntellingref-129-FcgdtccgttgtggtggIntellingref-129-FcgdtccgttgtggtggIntellingref-129-FcgdtccgttgtggtggIntellingref-129-FcgdtccgttgtggagaggtggIntellingref-129-FcgdtgcdtattacaaaIntellingref-129-FttggagatgaaggtgtgIntellingref-129-FttggagatgaaggtgtgIntellingref-129-FttggagatgaagagtgtgIntellingref-129-FttggagatgaagagtgtgIntellingref-129-FttggagatgaagagtgtgIntellingref-129-FttggagatgaagaaggtgtgIntellingref-129-FttggagatgaagaaggtgtgIntellingref-129-FttggagatgaagaaggtgtgIntellingref-129-FttggagatgaagaaggtgtgIntellingref-129-FttggagatgagaagatgIntellingref-129-FttggagatgagaagatgIntellingref-129-Fttggagatgaga	P <i>danP</i> -F	CCCAAGCTTacgcttagggtagcgaatcga	<i>Hin</i> dIII
P5A2-FCCCCAGCTTaggagagggagaagdaaatHntllP5A2-RCCCCTGAActaggattattactccetteXholP5A2-RCCCCTGAActaggattattactccetteXholP5A2-RCCCCTGAActaggattattactccetteXholtreR-199-FaacaaattgcaggaacaatInternet and attaggaggagaaggatatreR-199-FgaaagaacagtcggaacaatInternet and attaggaggaacaggattreR-199-FtoggagaacaggatInternet and attaggaggaggaaggaggaggaggaggaggaggaggagg	P <i>dnaP</i> -R	CCGCTCGAGcggcctgaacactctatata	Xhol
P5A2-RCCGCTGCAGCaggattitactoccitteXholtraR-199-F.atgaagacaacagtatattraR-199-F.atgaagacaacagtatattreR-139-F.atacgaatgacgagacaattreR-139-F.gaaacagtgggggaatreR-199-F.gaaacagtgggggaatreR-199-F.gigctgccagaacggttreR-199-F.gigctgccagaacggttreR-199-F.togagcaatgggaagggaatreR-199-F.toggtccagggaagaagggttreR-127-F.toggttccaggtggaatreR-127-F.toggttccaggtggaatreR-127-F.coggttccaggtggaatreR-127-F.coggttccaggtggaatreR-127-F.coggttccaggtggaatreR-127-F.coggttccaggtggaatreR-127-F.coggttccaggtggaatreR-127-F.coggttccaggtggaatreR-127-F.coggttccaggtggaatreR-128-F.coggatgaatatacaaatreR-129-F.coggatgaataggtaitreR-129-F.ttcggaagaaggatagtreR-129-F.ttcggaagaaggatagtreR-129-F.ttcggaagaaggtaigtreR-129-F.ttcggaagaaggatagtreR-129-F.ttcggaagaaggatagtreR-129-F.ttcggaagaaggatagtreR-129-F.ttcggaagaaggatagtreR-129-F.ttcggaagaaggatagtreR-129-F.ttcggaagaaggatagtreR-129-F.ttccaatcoctoctocttreA-122-F.AGCTTTAAGCTatctagccggtgtgtcccgtreA-129-F.AGCTTTAAGCTatctagccggtgtgtcccgtreA-129-F.CCCGGGaaggaatttcgaAAGCTatctcagccggtgtgtcccgtreA-129-F.AGCTTagagaatttcgaAAGCTatctcagccggtgtgtcccgtreA-129-F.CCCGG	P5A2-F		<i>Hin</i> dIII
IneR-199-FatgaagataaaagatatIneR-199-FaaacaatgaagaacaatIneR-199-FaaacaatgaagaacaatIneR-199-FgaaagacaatgaagaacIneR-199-FtogaggaaaaggatIneR-199-FtogaggaaaaggatIneR-199-F(F-biotin)cigaccaacaggagaIneR-199-F(F-biotin)cigaccaacaggagaIneR-199-F(F-biotin)cigaccaaggagaIneR-122-FciggetgacaaggagaIneR-124-FciggetgacaggagaIneR-124-FciggetgacaggagaIneR-124-FciggetgacaggagaIneR-124-FciggetgacaggagaIneR-124-FciggetgacaggagaIneR-124-FciggetgacaggagaIneR-124-FciggetgacaggatagIneR-124-FciggetgacaggatagIneR-124-FciggetgacaggatagIneR-124-FciggetgacaggatagIneR-124-FciggececcatactIneR-124-FciggececcatactIneR-124-FattcacacggatagIneR-124-FtitcagacaggttgaIneR-124-FtitcagacaggttgaIneR-124-FtitcagacaggttgaIneR-124-FtitcagacaggttgaIneR-124-FtitcagacaggttgaIneR-124-FtitcagacaggttgaIneR-124-FtitcagacaggttgaIneR-124-FtitcagacaggttgaIneR-124-FciccatactaccagIneR-124-FciccatactaccagIneR-124-FciccatactacagaIneR-124-FciccatactacagaIneR-124-FciccatagaaattagaAAGCTIneR-124-FciccatagaaattagaAAGCTIneR-124-FciccatagaaattagaAAGCTIneR	P5A2-R	CCG <u>CTCGAG</u> ctaggattttacctccctttc	Xhol
IneR-169-FaaacaaatigoogaacaatiIneR-169-FaaacaactigoogaacaatiIneR-169-FgaaacaactigoogaacaatiIneR-169-FigaacagactigogaIneR-169-R(S-biolin)cigacctittactictagatiIneR-169-R(S-biolin)cigacctittactictagatiIneR-169-R(S-biolin)cigacctittactictagatiIneR-169-R(S-biolin)cigacctittactictagatiIneR-169-R(S-biolin)cigacctittactictagatiIneR-169-R(S-biolin)acgaccgtaccagagagagatiIneR-169-R(S-biolin)acgaccgtaccagagagagatiIneR-169-R(S-biolin)acgaccagattactagaIneR-169-R(S-biolin)acgaccagattagaaIneR-169-R(S-biolin)acgaccagattagagatiIneR-169-R(S-biolin)acgaccagattagagatiIneR-169-R(S-biolin)acacaattactagIneR-169-R(S-biolin)acacaattacctagIneR-169-R(S-biolin)acacaattacctagIneR-169-R(S-biolin)acacaattacctagIneR-169-R(S-biolin)acacaattacctagIneR-169-R(S-biolin)acataacaagaccggcgIneR-169-R(S-biolin)ticcagccggtittaccgIneR-169-R(S-biolin)ticcagccggtittaccgIneR-169-R(S-biolin)ticcagccggtittaccgIneR-169-R(S-biolin)ticcagccggtittaccgIneR-169-R(S-biolin)ticcagccggtittaccgIneR-169-R(S-biolin)ticcagcccgtactactagacggtittaccgIneR-169-R(S-biolin)ticcagccggtittaccgIneR-169-R(S-biolin)ticcagccggtittaccgIneR-169-R(S-biolin)ticcagccggtittaccgIneR-169-R(S-biolin)ticcagccggtittaccgIneR-169-R(S-biolin)ticcagccggti	<i>treR</i> -199-F	atgaagatcaacaagtatat	
treR-139-FaiacigaaggatatreR-139-FgaaaaggactigcogaatreR-139-FgagaaaggactigcogatreR-139-FgigotigccagaaggattreR-139-FgigotigccagaaggattreR-149-FgigotigccagaaggattreR-122-FagatcaaggaagaaggattreR-112-FtcgjgcigcacaggagaatreR-122-FcggacgaccaggitogatreR-122-FcgacggccagattogatreR-122-FcgacggccacagttogatreR-122-FcgacggccacatactttreR-122-FcgacggccacatactttreR-124-FttcggaagatgaaggattreR-124-FttcggaagatgaaggattreR-124-FttcggaagtaggaattgtreR-124-FttcggaagtaggaattgtreR-124-FttcggaagtaggaattgtreR-124-FttcggaagtaggaattgtreR-124-FttcggaagtaggaattgtreR-124-FttcggaagtaggaattgtreR-124-FttcggaagtcgtcacaggtreR-124-FttcgaccgttgttccogcPtreA-124-FttcgaccgttgttccogcPtreA-124-Fttgcactatggaagtattgtre-24-FAcCTTTaagtcgacgttgttccogtre-24-FAcCTTTaagtcgacgttgttccogtre-24-FAcCTTTaagtcgacgttgttccogtre-24-FAcCTTTaagtcgacgttgttccogtre-24-FAcCTTTaagtcgacgttgttccogtre-24-FAcCTTTaagtcgacgttgttccogtreR-24-FCCCCGGGaagaacttcgacCCGGdactcagccggttgttccogtreR-24-FCCCCGGGaagaacttcgagACCTTatctagccggttgttccogtreR-24-FCCCCGGGaagaacttcgagACCTTatctagccggttgttccogtreR-24-FCCCCGGGaagaacttcgagACCTTatctagccggttgttccogtreR-24-	<i>treR</i> -169-F	aaacaaattgcagaacaaat	
treR-109-FgaaacgaccigocgaactreR-19-FtogaggaacggattreR-49-FtogaggaacggattreR-49-FtogaccetttocttigattreR-199-R(5-biotin)ctgaccetttocttigattreR-199-R(5-biotin)ctgaccetttocttigattreR-122-FagatcaaggaacggattreR-122-FcogtttocogttiggcagtreR-122-FcogtttocogttiggcagtreR-122-FcogtttocogttiggcagtreR-122-FcogactococagattocgtreR-122-FcogactococagattocgtreR-222-R(5-biotin)acoaccocagattocgtreR-194-FttotgogatgaagatggatgtreR-194-FttotgogatgaagatggatgtreR-194-FatoccaataggaatgtreR-194-FatoccaataggaatgtreR-194-FatoccaataggaatgtreR-194-FatoccaataggaatgtreR-194-FatoccaataggaatgtreR-194-FatoccaatagcogttgtocogPtreA-192-R(5-biotin)caatattocttottagPtreA-192-R(5-biotin)taatatagtdcaatdttreA-202-RFatoccaatacctocttotPtreA-192-R(5-biotin)ttocaatcctocttotPtreA-192-R(5-biotin)ttocaatcctocttotPtreA-192-R(5-biotin)ttocaatcctocttottre-26-1-FAGCTTTaaggaactticagaAAGCTatctcagcogttgttocogtre-26-1-FAGCTTTaaggaactticagaAAGCTatctcagcogttgttocogtre-26-1-FAGCTTTaaggaactticagaAAGCTatctcagcogttgttocogtre-26-1-FAAGCTatagaaccttcagaCCGGGatctcagcogttgttocogtreR(12-2-1-FAAGCTTatctagacogttgttocogtreR(12-2-1-FAAGCTatagaactticagaAAGCTatctagcogttgttocogtreR(12-2-1-FAAG	<i>treR</i> -139-F	atactgaatgccggagata	
treR-79-F togaggaaaggitogga   treR-49-F gjettigeceagaaeggit   treR-199-R(5'-biotin) etgacettitectitigatat   treR-191-R(5'-biotin) togacetticettiggata   treR-142-F toggitocagitiggigag   treR-142-F cogittecagitiggigag   treR-122-F agatcaaaggaaaggitiggigag   treR-124-F coggitocatiggitiggigag   treR-124-F coggitocatiggitiggigag   treR-252-F coggitocatiggitiggigag   treR-125-F coggitocatiggitiggigag   treR-126-F tttcagaaacgettiggigag   treR-136-R(5'-biotin) accaccatitectatig   treR-194-R(5'-biotin) gaccacatitectatig   treR-194-R(5'-biotin) gaccacatitectatig   treR-194-R(5'-biotin) acataaaaaaagccoggec   PtreA-102-F ttgaaggactitaaaat   PtreA-102-F ttgaaggactitaaaat   PtreA-102-F ttgaaggactitaaaat   PtreA-102-F ttgaaggactitagaCCGGGGattcagcogttgttcccg   tre-20-2-F AGCTTTaacgacetticagaAAGCTatctcagcogttgttcccg   tre-20-2-F AGCTTTaacgacetticagaAAGCTatctcagcogttgttcccg   tre-20-2-F AGCTTTaacgacetticagaAAGCTatctcagcogttgttcccg   tre-20-2-F AGCTTTaacgacetticagaAAGCTatctcagcogttgttcccg   tre-20-2-F AGCTTTaacgacetticagaAAGCTatctcagcogttgttcccg   tre-20-2-	<i>treR</i> -109-F	gaaaacgaccttgccgaac	
treR-49-F gigctigcccaggaacgjat   treR-199-R(5-biotin) ctgacccattertitgatt   treR-202-F agatcaaggaaagggt   treR-122-F togtgatgccaaggagaa   treR-122-F togtgatgccaaggagaa   treR-122-F togtgatgccaaggagaa   treR-122-F togtgatgccaaggattogg   treR-122-F cogacgttccacgattogg   treR-202-R(5-biotin) acgaccattocacgattogg   treR-202-R(5-biotin) gacgacaggatgat   treR-142-F tottggaagaaggatga   treR-142-F tottggaagaaggatga   treR-142-R(5-biotin) gacgaccattacctatt   treR-144-R(5-biotin) gacacaatttoctatg   treR-144-R(5-biotin) caattagacgaattg   treR-144-R(5-biotin) aattacaatagataagacctgggcg   PtreA-102-R(6-biotin) aattacaatagataagccoggcg   PtreA-102-R(6-biotin) ttcgacggttgttcccgg   PtreA-102-R(6-biotin) ttccaatccctctctc   PtreA-102-R(6-biotin) ttccaatccctctctc   PtreA-102-R(6-biotin) ttccaatccctctctc   PtreA-102-R(6-biotin) ttccaatccctctctc   PtreA-102-R(6-biotin) ttccaatccctctctc   PtreA-102-R(6-biotin) ttccaatccctctctc   PtreA-102-R(6-biotin) ttccaatccaggattccaagAAAGCTattocagcogttgttcccg   tte-26-F AGCTTTagacacttccagacCGGGattccagcoggttgttccc	treR-79-F	tcgagggaaacggttcgga	
traR-199-R(5-biotin) ctgaccttticctttgatt   traR-202-F agatcaaaggaaaagggl   traR-12F-F toglotgtacaaggaaaagggl   traR-142-F coggittcogittggicag   traR-12F-F toglotgtacaaggaaaggl   traR-12F-F cogagitcoggittggicag   traR-52F cogagitgcatatticaaaa   traR-12F-F togagatgaaggaggl   traR-12F-F cogagitgcatatticaaaa   traR-12F-F cogagitgcatatticaaaa   traR-196-R(5-biotin) agaccacatttccttg   traR-194-F atccagcogitgtcogg   traR-194-R(5-biotin) gaccacaatttccttg   traR-194-R(5-biotin) catcttactcttctg   Ptra-4.88-R(5-biotin) aattcagacogitgtcogg   Ptra-4.88-R(5-biotin) aattcagacogitgttcogg   Ptra-4.98-R(5-biotin) tacttcagtcogttgttcogg   Ptra-4.98-R(5-biotin) tactcagtcogttgttcogg   Ptra-4.98-R(5-biotin) tactagttgacattg   tra-20-2F tagaaggatattgagaAAGCTatccagcogtgttcccg   tra-20-2F AGCTTTaaggaactttcagaCCGGGattccagcogtgttcccg   tra-20-2F AGCTTAAGCTattccagcCggttgttcccg   tra-20-2F AGCTTAAGCTattccagcogtgttgtcccg   tra-20-2F AGCTTAAGCTattccagcogtgttgtccg   tra-20-2F AGCTTAAGCTattccagcogtgttgtccg   tra-20-2F AGCTTAAGCTTattccagcogttgttccg	treR-49-F	gtgcttgcccagaacggat	
traR-202-F agataaaggaaagggt   traR-172-F tcggdttocggggaa   traR-142-F cggdttocggtggcag   traR-142-F cggdttocggtgcag   traR-122-F cggdttocggtgcag   traR-122-F cggdttocggtgcag   traR-122-F cggdttocggtgcag   traR-25-F cggdttocggtgcag   traR-262-RG-biolin) acgaccoccatactut   traR-196-F ttdggagagaatgg   traR-196-RG-biolin) gaccacaattuctatg   traR-194-RG-biolin) gaccacaattuctatg   traR-194-RG-biolin) cacattaggcggttgtcccggc   Ptra-4-88-F attcggccgttgttcccggc   Ptra-4-88-F attcggccgttgttcccggc   Ptra-4-88-F attcggccgttgttcccggc   Ptra-4-88-F attcggccgttgttcccgg   Ptra-4-88-F attcggccgttgttcccgg   Ptra-4-88-F attcggccgttgttcccgg   Ptra-4-88-F Attcgccattagacgttgttcccg   Ptra-4-88-F Attcgctagacgttgttcccg   Ptra-4-88-F Attcgctagacgttgttcccg   Ptra-4-88-F Attcgctagacgttgttcccg   Ptra-4-88-F Attcgctagacgttgttcccg   Ptra-4-88-F Attcgctagacgttgttcccg   Ptra-4-88-F Attcgctagacgttgttcccg   Ptra-4-88-F AttcgtagacgtttggagaAttcgacgttgttcccg   Ptra-4-102-F Attcgtagagagtt	<i>treR</i> -199-R(5'-biotin)	ctgacccttttcctttgatct	
treR-172-F tcgtgtcgaaggaga   treR-142-F cggttcgaaggaga   treR-142-F cggaaggctgaaga   treR-12-F tttcggaaaggttggg   treR-22-F cggacggccaagattcgg   treR-22-F cggacggccaagattcgg   treR-196-F tttggagagagagttg   treR-196-F tttggagagagagttg   treR-196-F tttggagagagagttg   treR-196-F tttggagagagagttg   treR-196-R(5'-biotin) gaccccaatttcttatg   treR-196-R(5'-biotin) gaccccaatttcttgca   PtreA-88-FF attctagccgttgttcccggc   PtreA-88-FF attctagccgttgttcccgg   PtreA-88-R(5'-biotin) aataaaaaagacccggtgcg   PtreA-102-F ttgaagagcttaaaaat   PtreA-102-F ttgaagttcgaaAAAGCTatctcagccggttgttccg   tre-20-2-F AGCTTTaaggaactttcagaAAGCTatctcagccggttgttccg   tre-20-2-F AGCTTTaaggaactttcagaAAGCTatctcagccggttgttccg   tre-26-5-F AGCTTTaaggaactttcagaAAGCTatctcagccggttgttccg   tre-26-5-F AGCTTTaaggaactttcagaACCGGGaattcagccggttgttccg   tre(R)-22-F AAAGCTaggaagttcagaAGCTTatctcagccggttgttccg   tre(R)-26-1-F AAAGCTaggaagttcagaAGCTTatctcagccggttgttccg   tre(R)-26-5-F CCCGGGaaggaactttcagaACCGGgaattcagccggttgttccg   tre(R)-26-5-F CCCGGGaaggaactttcagaAAGCTatctcagccggttgttccg   tr	treR-202-F	agatcaaaggaaaagggt	
treR-142-F cognitocognitigicag   treR-112-F tittagaaacgetigcaa   treR-12-F cogagicacagagitag   treR-12-F cogagicatataticaaaa   treR-22-F cogagicatataticaaaa   treR-22-R(5-biotin) acgaccoccatacctet   treR-196-F tittagagaagagagitag   treR-196-R(5-biotin) gacccacaticctatg   treR-194-R(5-biotin) ctaatacaaagaaatg   treR-194-R(5-biotin) ctaattitcitatigaa   treR-194-R(5-biotin) ctaattitcitatigaa   PtreA-88-F attcaacgogigtitccoggc   PtreA-88-F attcaacgogigtitcocggc   PtreA-88-F attcaacgogigtitcocggc   PtreA-88-F attcaacgogigtitcocggc   PtreA-102-F ttgaaagogctataaaaa   PtreA-102-F ttgaaagogctataaaata   PtreA-102-R(5-biotin) ttcaatacatictaagocgigtittcocg   tre-26-1-F AGCTTTaagaaatttagaAAGCTatctagcogigtigttccog   tre-26-1-F AGCTTTaagaaatttagaAAGCTatctagcogigtigttccog   tre-26-5-F CCCGGGaaggaactttagaAAGCTatctagcogigtigttccog   tre/26-5-F AAGCTTaaggaacttcagaAGCTTatctagcogigtigttccog   tre/26-5-F AAGCTTaaggaacttcagaAGCTTatctagcogigtigttccog   tre/26-5-F CCCGGGaaggaacttcagaAGCTTatctagcogigtigttccog   tre/26-5-F AAAGCTaaggaacttcagaACCTTatctagcogigtigttccog	<i>treR</i> -172-F	tcgtgctgcacagggaga	
twR-112-F tittaagaaacgitigjcaa   twR-122-F cgaggiccacqagticgg   twR-222-R(5-biolin) acgaccoccatacctett   twR-212-R(5-biolin) gaccacaattoctatig   twR-196-R(5-biolin) gaccacaattoctatig   twR-196-R(5-biolin) gaccacaattoctatig   twR-196-R(5-biolin) gaccacaattoctatig   twR-194-R(5-biolin) cacacaattoctatig   twR-194-R(5-biolin) catatttettoctaga   Ptra-885-R attocagcogtigtoccogc   Ptra-488-R(5-biolin) catatttettoctatiga   Ptra-402-R(5-biolin) attacaacagtogtigtoccog   Ptra-402-R(5-biolin) ttocaatcoctocttoc   Ptra-402-R ttocaatcoctocttoc   Ptra-402-R ttocaatcoctocttoc   Ptra-402-R AGCTTTaaggaactttcaagAAAGCTatotcagcoggtigttocog   tra-26-1-F CaCGGGaaggaactttcagaCCGGGattctagcoggtigttocog   tra-26-5-F AGCTTTaaggatcttagaCCGGGattctagcoggtigttocog   tra-26-5-F AAGCTTaaggatcttagaCCGGGattctagcoggtigttocog   tra(R)-22-F AAAGCTaaggaactttcagaAAGCTTatotcagcoggtigttocog   tra(R)-22-F AAAGCTaaggaactttcagaAAAGCTTatotcagcoggtigttocog   tra(R)-22-F AAAGCTaaggaactttcagaAAAGCTatotcagcoggtigttocog   tra(R)-22-F AAAGCTaaggaactttcagaAAAGCTatotcagcoggtigttocog   tra(R)-26-F CCCGGGaaggaacttcagaAAAGCTatatcagcoggtigttocog	<i>treR</i> -142-F	cggtttccggtttggtcag	
treP-82.F cgacgGccagagitGgg   treP-202.R(5-biotin) acgaccgccatactCtt   treP-196.F ttdggagagagagaggtigg   treP-196.FF ttdggagagagagaggtigg   treP-194.F atgcccatactCtt   treP-194.F ttdggagagagaggtigg   treP-194.F atgccccataggcaattg   treP-194.F atgccccataggcaattg   treP-194.F atgccccataggcaattg   treP-194.F atgccccataggcagt   PtreA-88.F atccacgccgttgtcccggc   PtreA-88.F atccacgccgttgtcccg   PtreA-88.F ttccacgccgttgtcccg   PtreA-102.F ttgaaaggctataaaat   PtreA-102.F ttgaaaggctataaaat   PtreA-102.F ttgaaaggctataaaat   PtreA-102.F ttgaaaggctatagaatt   tre-26.1.F AdCTTTAAQCTatctcagccggttgtcccg   tre-26.4.F CCCCGGGaaggaacttcagaAAGCTatctcagccggttgttccg   tre-26.4.F CCCCGGGaaggaacttcagaACCCGGGatctagccggttgttccg   tre/R>26.F.F AAGCTTAaggaacttcagaAGCTTatctcagccggttgttccg   tre(R)-26.F.F AAAGCTaaggaacttcagaAGCTTatctcagccggttgttccg   tre(R)-26.F.F AAAGCTaaggaacttcagaAGCTTatctcagccggttgttccg   tre(R)-26.F.F AAAGCTaaggaacttcagaAAGCTatctcagccggttgttccg   tre(R)-26.F.F AAAGCTaaggaacttcagaAAGCTTatctcagccggttgttccg   tre(R)-26.F.F AAAGCTaaggaac	<i>treR</i> -112-F	tttcagaaacgcttggcaa	
treR-52:F cggaccgccatactut   treR-202:R(5'-biotin) acgaccgccatactut   treR-196:R(5'-biotin) gacccacattucctuty   treR-194:R(5'-biotin) gacccacattucctuty   treR-194:R(5'-biotin) ctactagccggtgttcccgg   PtreA-88:F atccagccggtgttcccgg   PtreA-88:F(5'-biotin) ctactagccggtgttcccgg   PtreA-88:F(5'-biotin) ctactagccggtgttcccgg   PtreA-88:R(5'-biotin) tactagccggtgttcccgg   PtreA-102:R(5'-biotin) tactagccggtgttcccgg   PtreA-102:R(5'-biotin) ttccaatccctctctc   PtreA-102:R(5'-biotin) ttccaatccctctctc   PtreA-102:R(5'-biotin) ttccaatcccctctc   PtreA-102:R(5'-biotin) ttccaatcccctctcc   PtreA-102:R(5'-biotin) ttccaatcccctctc   PtreA-102:R(5'-biotin) ttccaatcccctctc   tre-26-1:F AGCTTTaaggacacttcagaCAAGCTatctcagccggttgttcccg   tre-26-5:F AGCTTTaaggaacttcagaCCCGGGatctcagccggttgttccg   tre-26-5:F AGCTTTaggaacttcagaCCCGGGatctcagccggttgttccg   tre(R):26-1:F AAGCTAggaacttcagaCCCGGGatctcagccggttgttccg   tre(R):26-1:F CCCGGGaaggaacttcagaCCGGGatctcagccggttgttccg   tre(R):26-5:F CCCGGGaaggaacttcagaCCGGGatctcagccggttgttccg   tre(R):26-5:F CCCGGGaaggaacttcagaCCGGGatctcagccggttgttccg   tre(R):26-6:F CCCGGGaaggaacttcagaCCGGGatctcag	treR-82-F	cgacggtccacgagttcgg	
treR-202-R(5'-biotin) acgaccegcoatacctctt   treR-196-F ttctggagatgaaggatag   treR-196-F ttctggagatgaaggatag   treR-196-F ttctggagatgaaggatag   treR-194-F algcccataagggaatag   treR-194-F algcccataagggaatag   treR-194-F algcccataagggaatag   treR-194-F algcccataagggaatag   treR-194-F algccataagggaatag   treR-194-F algccataagggaatag   treR-194-F ttcaagccggttgttcccgg   PtreA-402-F ttgaaggactttaagaaat   PtreA-102-R(5'-biotin) ttccaatccctcettc   PtreA-102-R(5'-biotin) ttccaatccctcettct   PtreA-102-R(5'-biotin) ttccaatccctcettc   PtreA-102-R(5'-biotin) ttccaatccctcettct   PtreA-102-R(5'-biotin) ttccaatccctcettcagaAAGCTatctcagccggttgttcccg   tre-26-5F AGCTTTaatgagaactttcagaACCGGGGatctcagccggttgttcccg   tre-26-5F AAGCTaaggaactttcagaAAGCTatc	treR-52-F	cggatgcatatattcaaaa	
treR-196-F ttdggagatgaagaggtatg   treR-196-R(5-biotin) gaccacatttocttatg   treR-194-R(5-biotin) gaccacatttocttatg   treR-194-R(5-biotin) ctactttocttoctaga   PtreA-88-F atccagcoggtgttoccggc   PtreA-88-F(5-biotin) aaataaaaaaaccccggccg   PtreA-102-F ttgaaaggcattaaaaaat   PtreA-102-R(5-biotin) aaataaaaaaacttccagaAAAGCTatctagccggttgttoccg   PtreA-102-R(5-biotin) ttocaatcoctocttac   PtreA-102-R(5-biotin) ttocaatcoctoctac   PtreA-102-R(5-biotin) ttocaatcoctoctac   tre-26-1F AGCTTTaatcagacgtgtgttoccg   tre-26-5F AGCTTTaatcagacgtttagaaACGTTatctcagccggttgttoccg   tre(R)-26-1F AAAGCTaaggaactttcagaACCTGGatctagccggttgttoccg   tre(R)-26-5F AAAGCTaaggaactttcagaACCCGGatctagccggttgttoccg   tre(R)-26-5F AAAGCTaaggaactttcagaAAAGCTatctagccggttgttoccg   tre(R)-26-5F AAAGCTaaggaactttcagaAAAGCTatctagccggttgttoccg   tre(R)-26-5F CAGCGGaaggaactttcagaAAAGCTatctagccggttgttoccg	<i>treR</i> -202-R(5'-biotin)	acgacccgccatacctctt	
treR-196-R(5'-biotin)gacacacattccttaigtreR-194-FatgcccataaggaaattgtreR-194-R(5'-biotin)ctacttttcttcttgcaPtreA-88-FatccagcogttgttcccggcPtreA-88-R(5'-biotin)aaataaaaaagcccggccgPtreA-102-FttgaaagcgctataaaaatPtreA-102-R(5'-biotin)aaataaaaaagcccggccgPtreA-102-R(5'-biotin)ttccaatccctcttcPtreA-102-R(5'-biotin)ttccaatccctcttcPtreA-102-R(5'-biotin)ttccaatccctcttcPtreA-102-R(5'-biotin)ttccaatcctcttctPtreA-102-R(5'-biotin)ttccaatcctccttcPtreA-102-R(5'-biotin)ttccaatcctccttcPtreA-102-R(5'-biotin)ttccaatcctccttcPtreA-102-R(5'-biotin)ttccaatcctccttcPtreA-102-R(5'-biotin)ttccaatcctccttcPtreA-102-R(5'-biotin)ttccaatcctccttcPtreA-102-R(5'-biotin)ttccaatcctccttcPtreA-102-R(5'-biotin)ttccaatcctctctcPtreA-102-R(5'-biotin)ttccaatccttcctcPtreA-102-R(5'-biotin)ttccaatccttctcPtreA-102-R(5'-biotin)ttccaatccttctctre3-5-FAGCTTTaatgaactttcaagaCAGCgdgtttcccgtte-26-5-FCCCGGGaaggaactttcaagaCCGGGattctagccggttgttcccgtte-26-1-FAAGCTTaaggaactttcaagaCCGGGattcagccggttgttcccgtte(R)-26-1-FAAGCTAaggaactttcaagaCCGGGattcagccggttgttcccgtte(R)-26-1-FCCCGGGaaggaactttcagaCAAGCTatctagccggttgttcccgtte(R)-26-5-FCCCGGGaaggaactttcagaCAAGCTatctagccggttgttcccgtte(R)-26-5-FCCCGGGaaggaactttcagaCAAGCTatctagccggttgttcccgtte(R)-26-5-FCCCGGGaaggaactttcagaAAAGCTatctagccggttgttc	<i>treR</i> -196-F	ttctggagatgaagaggtatg	
treR-194-F atgoccataaggaattg   treR-194-R(5'-biotin) ctacttttctcttctgca   PtreA-88-F attcagccgttgttcccggc   PtreA-88-F attcagccgtgtttcccggc   PtreA-88-R(5'-biotin) aataaaaagcccggccg   PtreA-102-R(5'-biotin) ttcaatcctcctctc   PtreA-102-R(5'-biotin) ttcaatccccctctcc   PtreA-102-R(5'-biotin) ttccaatccctcctct   PtreA-102-RF ttaatagttgatcattg   tre-20-2-F AGCTTTaaggaactttcagaAAGCTatctcagccggttgttcccg   tre-22-3-F AGCTTTaaggaactttcagaAAGCTatctcagccggttgttcccg   tre-26-4-F CCCGGGaaggaactttcagaAAGCTatctcagccggttgttcccg   tre-26-5-F AGCTTTaaggaactttcagaACCCGGGatctcagccgttgttcccg   tre(R)-20-2-F AAGCTaaggaactttcagaACCCGGGatctcagccgttgttcccg   tre(R)-20-2-F AAGCTaaggaactttcagaACCTTatctcagccgttgttcccg   tre(R)-20-2-F AAAGCTaaggaactttcagaACCTTatctcagccgttgttcccg   tre(R)-20-2-F AAAGCTaaggaactttcagaACCTTatctcagccgttgttcccg   tre(R)-26-4-F CCCGGGaaggaactttcagaACGTTatctcagccgttgttcccg   tre(R)-26-4-F CCCGGGaaggaactttcagaACGTTatctcagccgttgttcccg   tre(R)-26-5-F CCCGGGaaggaactttcagaAAGCTatctcagccgttgttccg   tre(R)-26-6-F CCCGGGaaggaactttcagaAAGCTatctcagccgttgttccg   tre(R)-26-6-F CCCGGGaaggaactttcagaAAGCTatctagccgttgttccg   T1-F CGCTTaaggaactttcagaAAGCTatctc	<i>treR</i> -196-R(5'-biotin)	gaccacaatttccttatg	
treR-194-R(5'-biotin) ctactituctituctituca   PtreA-88-F atctcagccggttgttcccggc   PtreA-88-F attcagccggttgttcccggc   PtreA-188-R(5'-biotin) aaataaaaagccggccg   PtreA-102-F ttgaaagcgtataaaaat   PtreA-102-R(5'-biotin) ttgaaagcgtataaaaat   PtreA-102-R(5'-biotin) ttgaaagcgtataaaaat   PtreA-102-R(5'-biotin) ttgaaagcgtataaaaat   PtreA-102-R(5'-biotin) ttgaaagcgtataaaaat   PtreA-102ACRE-F ttgaaagcgtataagaAAGCTatctcagccggttgttcccg   tte-20-2-F AGCTTTaaggaactttcagaAAGCTatctcagccggttgttcccg   tte-12-3-F AGCTTTaaggaactttcagaCCGGGattctagccggttgttcccg   tte-26-5-F CCCGGGaaggaactttcagaACCCGGGattctagccggttgttcccg   tte-86-5-F CCCGGGGaaggaactttcagaACCCGGGattctagccggttgttcccg   tte(R)-20-2-F AAGCTaaggaactttcagaAGCTTTatctcagccggttgttcccg   tte(R)-20-2-F AAGCTaaggaactttcagaAGCTTTatctcagccggttgttcccg   tte(R)-20-2-F AAGCTaaggaactttcagaAAGCTatctagccggttgttcccg   tte(R)-20-2-F AAGCTaaggaactttcagaAAGCTatctagccggttgttcccg   tte(R)-20-2-F AAGCTaaggaactttcagaAAGCTatctagccggttgttccg   tte(R)-26-5-F CCCGGGGaaggaactttcagaAAGCTatctagccggttgttccg   tte(R)-26-5-F CCCGGGGaaggaactttcagaAAGCTatctagccggttgttccg   tte(R)-26-5-F CCCGGGGaaggaactttcagaAAAGCTatctcagccggttgttccg   T1-F	<i>treR</i> -194-F	atacccataaqqaaattq	
PreA-88-FatctagccggtgttcccgcPreA-88-F(5'-biotin)aaataaaaagcccggcgPreA-102-FttgaagcgctataaaaatPreA-102-F(5'-biotin)ttccaatcctccttctcPreA-102-R(5'-biotin)ttccaatcctccttctcPreA-102-RCF-Ftaaatagttgaacattgtre-26-1-FAGCTTTaaggaactttcagaAAAGCTatctcagccggtgttcccgtre-20-2-FAGCTTTaaggaactttcagaAAAGCTatctcagccggtgttcccgtre-26-1-FAGCTTTaaggaacttcagacCggtgttcccgtre-26-5-FCCCGGGaaggaactttcagaCCGGGatctagccggtgttcccgtre-26-5-FCCCGGGaaggaactttcagaCCGGGatctagccggtgttcccgtre-26-6-FCCCGGGaaggaactttcagaCCGGGatctagccggtgttcccgtre/26-6-FCCCGGGaaggaactttcagaCCGGGatctagccggtgttcccgtre(R)-26-1-FAAAGCTaaggaactttcagaCCGGGatctagccggtgttcccgtre(R)-26-1-FAAAGCTaaggaactttcagaAGCTTTatctcagccggtgttcccgtre(R)-26-5-FAAAGCTaaggaactttcagaAGCTTTatctcagccggtgttcccgtre(R)-26-5-FAAAGCTaaggaactttcagaAGCTTatctcagccggtgttcccgtre(R)-26-6-FCCCGGGaaggaactttcagaACGTTatctcagccggtgttcccgtre(R)-26-6-FCCCGGGaaggaactttcagaAAGCTatctcagccggttgttcccgtre(R)-26-6-FCCCGGGaaggaactttcagaAAGCTatctcagccggttgttcccgT1-FCGCTTaaggaactttcagaAAGCTatctcagccggttgttcccgT1-FAGCTTTaaggaactttcagaAAGCTatctcagccggttgttcccgT1-FAGCTTaaggaactttcagaAAGCTatctcagccggttgttcccgT4-FAGCTTaaggaactttcagaAAGCTatctcagccggttgttcccgT6-FAGCTTaaggaactttcagaAAGCTatctcagccggttgttcccgT1-FAGCTTaaggaactttcagaAAGCTatctcagccggttgttcccgT1-FAGCTTaaggaactttcagaAAGCTatctcagccggttgttcccg <td< td=""><td><i>treR</i>-194-R(5'-biotin)</td><td>ctacttttctttcttgca</td><td></td></td<>	<i>treR</i> -194-R(5'-biotin)	ctacttttctttcttgca	
PreA-88-R(5'-biotin)aaataaaaaaacccggccgPreA-102-FttgaaagcgtataaaaatPreA-102-FttgaaagcgtataaaaatPreA-102-R(5'-biotin)ttocaatcctottotcPtreA-102ACRE-Ftaaatagttgactattgtre-26-1-FAGCTTTaaggatttagaaAAAGCTatctagccggttgttccgtre-20-2-FAGCTTTaaggaactttagaaCAAGCTatctagccggttgttccgtre-26-4-FCCCGGGaaggaactttagaaCCGGGatctagccggttgttccgtre-26-4-FCCCGGGaaggaactttagaaCCGGGatctagccggttgttccgtre-26-6-FCCCGGGaaggaactttagaaCCGGGatctagccggttgttccgtre(8)-26-1-FAAAGCTaaggaactttagaaCCGGGatctagccggttgttccgtre(8)-20-2-FAAAGCTaaggaactttagaaCCGGGatctagccggttgttccgtre(8)-26-1-FAAAGCTaaggaactttagaaCCGGGatctagccggttgttccgtre(8)-26-1-FAAAGCTaaggaactttagaaCCGGGatctagccggttgttccgtre(8)-26-1-FAAAGCTaaggaactttagaaCCGGGatctagccggttgttccgtre(8)-26-5-FAAAGCTaaggaactttagaCCGGGatctagccggttgttccgtre(8)-26-6-FCCCGGGaaggaactttagaACCGGatctagccggttgttccgtre(8)-26-6-FCCCGGGaaggaactttagaAAAGCTatctagccggttgttccgtre(8)-26-6-FCCCGGGaaggaactttagaAAAGCTatctagccggttgttccgtre(8)-26-6-FCCCGGGaaggaactttagaAAAGCTatctagccggttgttccgtre(8)-26-6-FCCCGGGaaggaactttagaAAAGCTatctagccggttgttccgtre1-5ACCTTTaggaactttagaAAAGCTatctagccggttgttccgtre1-6ACCTTaaggaactttagaAAAGCTatctagccggttgttccgtre1-7ACCTTaaggaactttagaAAAGCTatctagccggttgttccgtre1-7AGCTTTaaggaactttagaAAAGCTatctagccggttgttccgtre1-7ACCTTaaggaactttagaAAAGCTatctagccggttgttccgtre1-7AGCTTTaaggaactttagaAAAGCTatct	P <i>treA</i> -88-F	atctcagccggttgttcccggc	
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the 261-FAGCTTT aaggaactticagaAAAGCT at ctagecggtigticcegtre-20-2-FAGCTTT aaggaactticagaAAAGCT at ctagecggtigticcegtre-12-3-FAGCTTT AAAGCT at ctagecggtigticcegtre-26-4-FCCCCGGG aaggaactticagaAAAGCT at ctagecggtigticcegtre-26-5-FAGCTTT aaggaactticagaACCCGGG at ctagecggtigticcegtre(R)-26-1-FAAAGCT aaggaactticagaACCCGGG at ctagecggtigticcegtre(R)-20-2-FAAAGCT aaggaactticagaAGCTTT at ctagecggtigticcegtre(R)-26-5-FAAAGCT aaggaactticagaAGCTTT at ctagecggtigticcegtre(R)-26-6-FCCCGGG aaggaactticagaAGCTTT at ctagecggtigticcegtre(R)-26-5-FAAAGCT aaggaactticagaAGCTTT at ctagecggtigticcegtre(R)-26-6-FCCCGGG aaggaactticagaAAGCTT at ctagecggtigticcegtre(R)-26-6-FCCCGGG aaggaactticagaAAGCT at ctagecggtigtitccegtre(R)-26-6-FCCCGGG aaggaactticagaAAGCT at ctagecggtigticcegtre(R)-26-6-FCCCGGG aaggaactticagaAAGCT at ctagecggtigticcegtre(R)-26-6-FCCCGG GaaggaactticagaAAGCT at ctagecggtigticcegtre(R)-26-6-FCCCGG GaaggaactticagaAAGCT at ctagecggtigticcegtre(R)-26-6-FCCCGG GaaggaactticagaAAGCT at ctagecggtigticcegtre(R)-26-6-FCCCGG GaaggaactticagaAAAGCT at ctagecggtigticcegtre(R)-26-6-FCCCGG GaaggaactticagaAAGCT at ctagecggtigticcegtre(R)-26-6-FCCCGG GaaggaactticagaAAAGCT at ctagecggtigticcegtre(R)-26-6-FCCCGG GaaggaactticagaAAAGCT at ctagecggtigticcegtre(R)-26-6-FCCCGG GaaggaactticagaAAAGCT at ctagecggtigticcegtre(R)-26-7AGCTT aaggaactticagaAAAGCT at ctagecggtigticcegtre(R)-26-7AGCTT aaggaactticagaAA	PtreA-102ΔCRE-F	taaatatgttgactacttg	
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•		9	

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<i>xylB</i> -410-F	agcttttatgggaaagaaca
xylB-410∆CRETre-F	gtttgaaaaggcggccgt
<i>xylB</i> -410-R(5'-biotin)	attcgctgtgaagacgccc
<i>xylB</i> -1384-F	accttttcgccccgccgtga
xylB-1384∆CRETre-F	ctgtttcaaatttacagaga
xylB-1384-R(5'-biotin)	ttattcccgaaagctcgcca
<i>xyIR</i> -775-F	agctttacgcttcggaaaaagc
xylR-775∆CRETre-F	gtcttctctcactatggag
xyIR-775-R(5'-biotin)	gaaaccgttaaagaacttgc
<i>xyIA</i> -249-F	agcttttcaaaaaattca
xylA-249∆CRETre-F	gcttccgcccgggctttt
xyIA-249-R(5'-biotin)	atgacacatcctttggataaagc
<i>levR</i> -1359-F	agcttttttaatcagaaaat
<i>levR</i> -1359∆CRETre-F	tcaaaaccacagcttgctca
<i>levR</i> -1359-R(5'-biotin)	aattaaaggaagtcgctgaa
<i>manR</i> -1359-F	agcttttggatgaatgccgg
manR-1359∆CRETre-F	ggacagctcttgaaacagt
manR-1359-R(5'-biotin)	ctttatgctggctgtcaaac
Ptre48-F	cgctttcaaaaataaaaaaa
Ptre71-F	cggccgttcccttcataa
Ptre48-R(5'-biotin)	atctcagccggttgttcccg