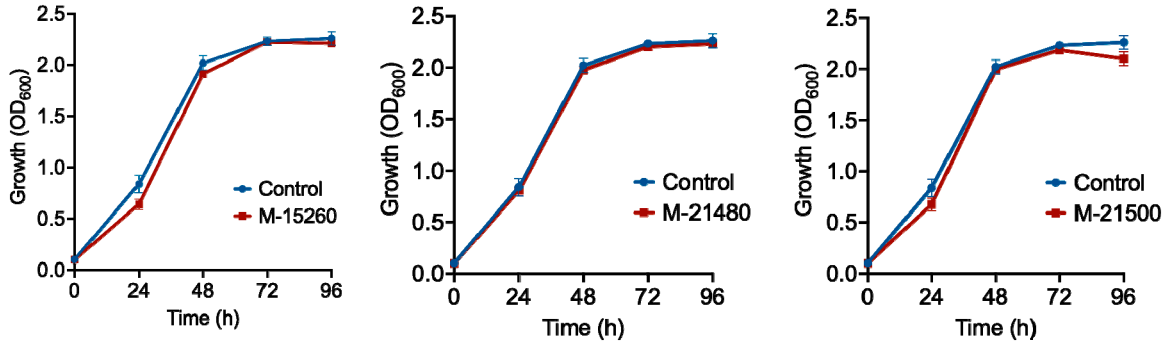
**Microorganisms**

**Supplementary Data**

# Pleiotropic Regulator GssR Positively Regulates Autotrophic Growth of Gas-Fermenting *Clostridium ljungdahlii*

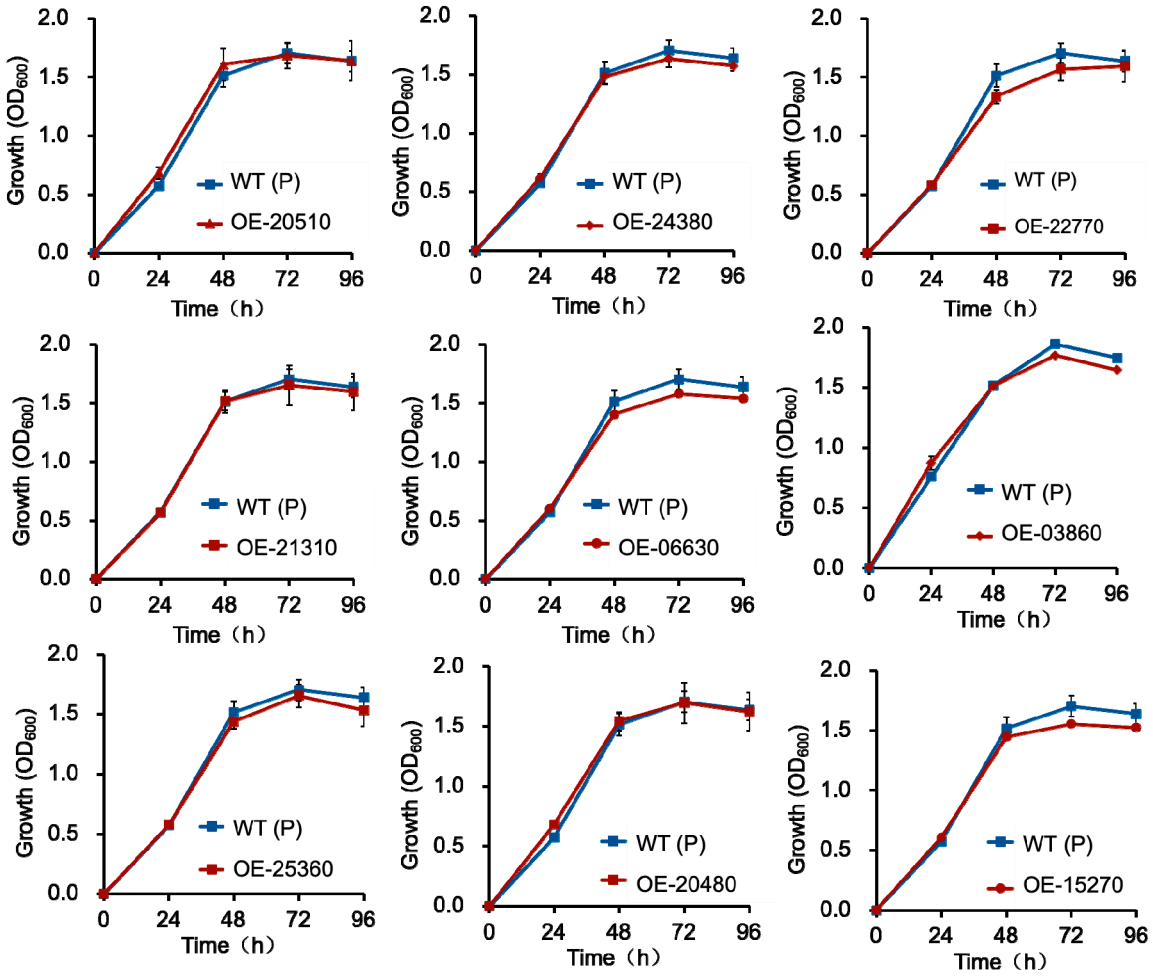
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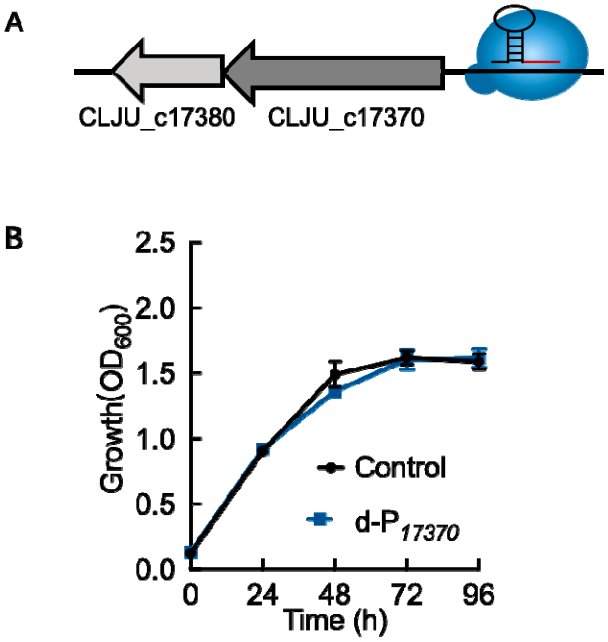



**Supplementary Figure S1.** Influence of the repression of CLJU_c15260 (M-315260), CLJU_c21480 (M-21480), or CLJU_c21500 (M-21500) on the growth of *C. ljungdahlii* in gas fermentation. The data are represented as mean ± standard deviation

(SD) ($n$ = 3). Error bars show SDs. Statistical analysis was performed by a two-tailed Student's $t$-test.




**Supplementary Figure S2.** Influence of the overexpression of nine genes that showed up-regulated transcriptional levels after the deletion of *gssR* on the growth of *C. ljungdahlii* in gas fermentation. The data are represented as mean ± standard deviation (SD) ($n$ = 3). Error bars show SDs. Statistical analysis was performed by a two-tailed Student's *t*-test.




**Supplementary Figure S3.** Influence of the repression of the gene cluster (CLJU_c17370–17380) for glutamate metabolism on the growth of *C. ljungdahlii* in gas fermentation.

**Supplementary Table S1. Strains used in this study**

| Strains | Description of genotypes | Source |
|---|---|---|
| **Strains** | | |
| ***E. coli*** | | |
| BL21 (DE3) | Strain used for protein overexpression | Novagen |
| DH5α | General cloning host strain | Invitrogen |
| ***C. ljungdahlii*** | | |
| WT (P) | Wild-type *C. ljungdahlii*, carrying the pMTL-83151 plasmid | This study |
| △*gssR* (P) | Wild-type *C. ljungdahlii* with the deletion of *gssR* (CLJU_c21350), carrying the pMTL-83151 plasmid | This study |
| △*gssR*-*gssR* | Wild-type *C. ljungdahlii* with the deletion of *gssR*, carrying the pMTL-$P_{gssR}$-*gssR* plasmid | This study |
| $P_{gssR}$-*gssR* | Wild-type *C. ljungdahlii*, carrying the pMTL-$P_{gssR}$-*gssR* plasmid | This study |
| WT | Wild-type *C. ljungdahlii*, DSM 13528 | DSMZ |
| △*gssR* | Wild-type *C. ljungdahlii* with the deletion of *gssR* | This study |
| Control | Wild-type *C. ljungdahlii*, carrying the pZG-ddFncas12a plasmid | This study |
| d-37350 | Wild-type *C. ljungdahlii*, carrying the pZG-ddFncas12a-37350 plasmid | This study |
| d-13550 | Wild-type *C. ljungdahlii*, carrying the pZG-ddFncas12a-13550 plasmid | This study |
| d-15260 | Wild-type *C. ljungdahlii*, carrying the pZG-ddFncas12a-15260 plasmid | This study |
| d-21480 | Wild-type *C. ljungdahlii*, carrying the pZG-ddFncas12a-21480 plasmid | This study |
| d-21500 | Wild-type *C. ljungdahlii*, carrying the pZG-ddFncas12a-21500 plasmid | This study |
| d-$P_{30000}$ | Wild-type *C. ljungdahlii*, carrying the pZG-ddFncas12a- $P_{30000}$ plasmid | This study |
| d-$P_{17370}$ | Wild-type *C. ljungdahlii*, carrying the pZG-ddFncas12a- $P_{17370}$ plasmid | This study |
| WT (P) | Wild-type *C. ljungdahlii*, carrying the pMTL-83151 plasmid | This study |
| $P_{37390}$-37390 | Wild-type *C. ljungdahlii*, carrying the pMTL83151- $P_{37390}$-37390 plasmid | This study |
| $P_{20510}$-20510 | Wild-type *C. ljungdahlii*, carrying the pMTL83151- $P_{20510}$-20510 plasmid | This study |

| | | |
|---|---|---|
| $P_{24380}$-24380 | Wild-type *C. ljungdahlii*, carrying the pMTL83151- $P_{24380}$-24380 plasmid | This study |
| $P_{22770}$-22770 | Wild-type *C. ljungdahlii*, carrying the pMTL83151- $P_{22770}$-22770 plasmid | This study |
| $P_{21310}$-21310 | Wild-type *C. ljungdahlii*, carrying the pMTL83151- $P_{21310}$-21310 plasmid | This study |
| $P_{06630}$-06630 | Wild-type *C. ljungdahlii*, carrying the pMTL83151- $P_{06630}$-06630 plasmid | This study |
| $P_{03860}$-03860 | Wild-type *C. ljungdahlii*, carrying the pMTL83151- $P_{03860}$-03860 plasmid | This study |
| $P_{25360}$-25360 | Wild-type *C. ljungdahlii*, carrying the pMTL83151- $P_{25360}$-25360 plasmid | This study |
| $P_{20480}$-20480 | Wild-type *C. ljungdahlii*, carrying the pMTL83151- $P_{20480}$-20480 plasmid | This study |
| $P_{15270}$-15270 | Wild-type *C. ljungdahlii*, carrying the pMTL83151- $P_{15270}$-15270 plasmid | This study |
| ***C. acetobutylicum*** | | |
| Cac | *C. acetobutylicum* ATCC 824 | ATCC |
| Cac-Mu | The *C. acetobutylicum* mutant with *CAC1850*::intron | This study |
| ***C. beijerinckii*** | | |
| Cbei | *C. beijerinckii* NCIMB 8052 | NCIMB |
| Cbei-Mu | The *C. beijerinckii* mutant with *Cbei1890*::intron | This study |

**Supplementary Table S2. Plasmids used in this study**

| plasmids | Description of genotypes | Source |
|---|---|---|
| pMTL83151 | *ColE1, catP, pCB102 ori* | Provided by Prof. Nigel P. Minton [21] |
| pMTLcas-*pta* | *pCB102 ori, catP, ColE1, tra,* $P_{thl}$*-cas9,* $P_{araE}$*-sgRNA,* homologous arms for *pta* | This lab [20] |
| pMTLcas-*gssR* | *ColE1, catP, pCB102 ori,* $P_{thl}$*-cas9,* $P_{1339}$*-sgRNA,* homologous arms for *gssR* | This study |
| pMTL83151- $P_{gssR}$-*gssR* | *gssR* overexpression, derived from pMTL83151 | This study |
| pMTL83151- $P_{37390}$-37390 | CLJU_c37390 overexpression, derived from pMTL83151 | This study |
| pMTL83151- $P_{20510}$-20510 | CLJU_c20510 overexpression, derived from pMTL83151 | This study |
| pMTL83151- $P_{24380}$-24380 | CLJU_c24380 overexpression, derived from pMTL83151 | This study |
| pMTL83151- $P_{22770}$-22770 | CLJU_c22770 overexpression, derived from pMTL83151 | This study |
| pMTL83151- $P_{21310}$-21310 | CLJU_c21310 overexpression, derived from pMTL83151 | This study |
| pMTL83151- $P_{06630}$-06630 | CLJU_c06630 overexpression, derived from pMTL83151 | This study |
| pMTL83151- $P_{03860}$-03860 | CLJU_c03860 overexpression, derived from pMTL83151 | This study |
| pMTL83151- $P_{25360}$-25360 | CLJU_c25360 overexpression, derived from pMTL83151 | This study |
| pMTL83151- $P_{20480}$-20480 | CLJU_c20480 overexpression, derived from pMTL83151 | This study |
| pMTL83151- $P_{15270}$-15270 | CLJU_c15270 overexpression, derived from pMTL83151 | This study |
| pZG-ddFncas12a | *ColE1, catP, pCB102 ori,* $P_{01440}$*-Fncas12a,* $P_{thl}$ | This lab [25] |
| pZG-ddFncas12a-37350 | CLJU_c37350 repression vector derived from pZG-ddFncas12a | This study |
| pZG-ddFncas12a-13550 | CLJU_c13550 repression vector derived from pZG-ddFncas12a | This study |
| pZG-ddFncas12a-15260 | CLJU_c15260 repression vector derived from pZG-ddFncas12a | This study |
| pZG-ddFncas12a-21480 | CLJU_c21480 repression vector derived from pZG-ddFncas12a | This study |
| pZG-ddFncas12a-21500 | CLJU_c21500 repression vector derived from pZG-ddFncas12a | This study |
| pZG-ddFncas12a-$P_{30000}$ | The vector for repressing purine metabolism, | This study |

| | | |
|---|---|---|
| | derived from pZG-ddFncas12a | |
| pZG-ddFncas12a-$P_{17370}$ | The vector for repressing glutamate metabolism, derived from pZG-ddFncas12a | This study |
| pWJ1 | $Em^r$; $Amp^r$; *pCB102*; $P_{ptb}$; Group II intron | This lab [22] |
| pWJ1-CAC1850 | For *cac1850* inactivation by intron insertion at 381, 382s site | This study |
| pWJ1-Cbei1890 | For *cbei1890* inactivation by intron insertion at 357, 358s site | This study |

**Supplementary Table S3. Primers used in this study**

| Primer name | Sequence (5′–3′) | Description |
|---|---|---|
| *gssR*-gRNA-for | CTTAAGGAGGAGTTTTCGTCGACGC TAAATTAGGTGTGAGTGTGTTTTAG AGCTAGAAA | forward primer of *gssR* gRNA |
| gRNA-crRNA-rev | ATAAAAATAAGAAGCCTGCAAATG CAGGCTTCTTATTTTTATAAAAAAA GCACCGACTC | universal reverse primer of gRNA |
| *gssR*-UpArm-for | TGCAGGCTTCTTATTTTTATTAAGA CAAATAAGTATACAG | forward primer of *gssR* up homologous arm |
| *gssR*-UpArm-rev | CCCTTGTAGAAAATTCATCTTTGCT TCATTCCTTTCTTTC | reverse primer of *gssR* up homologous arm |
| *gssR*-DownArm-for | AGATGAATTTTCTACAAGGG | forward primer of *gssR* down homologous arm |
| *gssR*-DownArm-rev | AAGCTTGCATGTCTGCAGGCCTCGA GGAAGCAAATTTACTAATGTATG | reverse primer of *nrdR* down homologous arm |
| $P_{gssR}$-for | TGACCGCGGCCGCTGTATCCATATG GGCATTTTCAAAGAAATAAC | forward primer used for *gssR* overexpression |
| $G_{gssR}$ -rev | GTAAAACGACGGCCAGTGCCAAGC TTTTAATTTTGTTCTCTAAAAG | reverse primer used for *gssR* overexpression |
| $P_{37390}$-for | GCGGCCGCTGTATCCATATGATAAG TTATAGAGTTTCTAACTTAAAAAT | forward primer used for CLJU_c37390 overexpression |
| $G_{37390}$-rev | ACGACGGCCAGTGCCAAGCTTCTAT TTTAATCTAATTAAAAGTTCTCCAG | reverse primer used for CLJU_c37390 overexpression |
| $P_{20510}$-for | GCGGCCGCTGTATCCATATGATGCA TGATAAACAGAGTTCT | forward primer used for CLJU_c20510 overexpression |
| $G_{20510}$-rev | CCATATCAACATTAATATCTATCTT CATTTTTAGACCTCCTTAAATCGG | reverse primer used for CLJU_c20510 overexpression |
| $P_{24380}$-for | GCGGCCGCTGTATCCATATGATTTA AAGTGGGGCGTCAC | forward primer used for CLJU_c24380 overexpression |
| $G_{24380}$-rev | CCGTGTATTAATAATGATTCTATAT TCATGATTATTGTCCTCCTTATAAA TAATTTC | reverse primer used for CLJU_c24380 overexpression |
| $P_{22770}$-for | GCGGCCGCTGTATCCATATGTACAT ATGTCTCCTTTTGAGGT | forward primer used for CLJU_c22770 overexpression |
| $P_{22770}$-rev | CATCATTAAGGATTTTATCTATAGT CATTAGATCACCTCCTGTATTAGAT | reverse primer used for CLJU_c22770 overexpression |
| $G_{22770}$-for | ATCTAATACAGGAGGTGATCTAAT GACTATAGATAAAATCCTTAATGAT G | forward primer used for CLJU_c22770 overexpression |
| $G_{22770}$-rev | ACGACGGCCAGTGCCAAGCTTCTA ATAATCTCTTGATATTTCATATTCT | reverse primer used for CLJU_c22770 overexpression |

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|---|---|---|
| | G | |
| $P_{21310}$-for | GCGGCCGCTGTATCCATATGATTAA ATATTTTTAATTTACTACCCTGAAG | forward primer used for CLJU_c21310 overexpression |
| $G_{21310}$-rev | ACGACGGCCAGTGCCAAGCTTTTAT ATATTTGAAGCTTTTACTTCTACAA C | reverse primer used for CLJU_c21310 overexpression |
| $P_{06630}$-for | GCGGCCGCTGTATCCATATGAAAAT TATTCCTCCTTGAAAATTCT | forward primer used for CLJU_c06630 overexpression |
| $G_{06630}$-rev | AGAGTAACTTTATGCGTCATTTAAT TCATCTCCTCGGATTAATAT | reverse primer used for CLJU_c06630 overexpression |
| $P_{03860}$-for | GCGGCCGCTGTATCCATATGGCTGA TGAAAAGAGCATGTT | forward primer used for CLJU_c03860 overexpression |
| $G_{03860}$-rev | ACGACGGCCAGTGCCAAGCTTTTA AAGTTTGTTCACAATAAATTTAGG | reverse primer used for CLJU_c03860 overexpression |
| $P_{25360}$-for | GCGGCCGCTGTATCCATATGAAGTA AGTGATAAGGTAGCT | forward primer used for CLJU_c25360 overexpression |
| $G_{25360}$-rev | ACGACGGCCAGTGCCAAGCTTTTAT GCTGTAAATTTATTATTTTTTGTG | reverse primer used for CLJU_c25360 overexpression |
| $P_{20480}$-for | GCGGCCGCTGTATCCATATGATGCA TGATAAACAGAGTTCT | forward primer used for CLJU_c20480 overexpression |
| $P_{20480}$-rev | AATAATAACATCATACTTGCTCATT TTTAGACCTCCTTAAATCGGTAA | reverse primer used for CLJU_c20480 overexpression |
| $G_{20480}$-for | TTACCGATTTAAGGAGGTCTAAAA ATGAGCAAGTATGATGTTATTATT | forward primer used for CLJU_c20480 overexpression |
| $G_{20480}$-rev | ACGACGGCCAGTGCCAAGCTTTTA GAGCTTAGGTGCTATTTTG | reverse primer used for CLJU_c20480 overexpression |
| $P_{15270}$-for | GCGGCCGCTGTATCCATATGCTTTA TATCCTCCTTTTAATAAATTGT | forward primer used for CLJU_c15270 overexpression |
| $G_{15270}$-rev | ACGACGGCCAGTGCCAAGCTTTTAT AAAATTACGTCTCTATTACAATCC | reverse primer used for CLJU_c15270overexpression |
| Universal-for | CCCCGTATCAAAATTTAGGAGGTTA GGATCCAATTTCTACTGTTGTAGAT | Universal forward primer of gene repression |
| Universal-rev | CCGTCGACCCCGGGCCATGGATAA AAATAAGAAGCCTGCAAATGCAGG | Universal reverse primer gene repression |
| *gssR*-crRNA-for | GGATCCAATTTCTACTGTTGTAGAT GAAGACATTTGGAAAGAGTATCAA | forward primer used for *gssR* repression |
| *gssR*-crRNA-rev | TAAGAAGCCTGCAAATGCAGGCTT CTTATTTTTATTTGATACTCTTTCCA AATGTCTTC | reverse primer used for *gssR* repression |
| 37350-crRNA-for | GGATCCAATTTCTACTGTTGTAGAT AAATCAGGAAAGTACAACAATACA | forward primer used for CLJU_c37350 repression |
| 37350-crRNA-rev | TAAGAAGCCTGCAAATGCAGGCTT | reverse primer used for |

| | | |
|---|---|---|
| | CTTATTTTTATTGTATTGTTGTACTTTCCTGATTT | CLJU_c37350 repression |
| 13550-crRNA-for | GGATCCAATTTCTACTGTTGTAGATATGAAGAGGTTAGAACTTATTATT | forward primer used for CLJU_c13550 repression |
| 13550-crRNA-rev | TAAGAAGCCTGCAAATGCAGGCTTCTTATTTTTATAATAATAAGTTCTAACCTCTTCAT | reverse primer used for CLJU_c13550 repression |
| 15260-crRNA-for | GGATCCAATTTCTACTGTTGTAGATTGCTCACCTGGGAAGCCTACAGAG | forward primer used for CLJU_c15260 repression |
| 15260-crRNA-rev | TAAGAAGCCTGCAAATGCAGGCTTCTTATTTTTATCTCTGTAGGCTTCCCAGGTGAGCA | reverse primer used for CLJU_c15260 repression |
| 21480-crRNA-for | GGATCCAATTTCTACTGTTGTAGATTTAAATATGGAAGAGTTACATGAT | forward primer used for CLJU_c21480 repression |
| 21480-crRNA-rev | TAAGAAGCCTGCAAATGCAGGCTTCTTATTTTTATATCATGTAACTCTTCCATATTTAA | reverse primer used for CLJU_c21480 repression |
| 21500-crRNA-for | GGATCCAATTTCTACTGTTGTAGATGTGTAGATCAAGTACTTGAATCCA | forward primer used for CLJU_c21500 repression |
| 21500-crRNA-rev | TAAGAAGCCTGCAAATGCAGGCTTCTTATTTTTATTGGATTCAAGTACTTGATCTACAC | reverse primer used for CLJU_c21500 repression |
| $P_{30000}$-crRNA-for | GGATCCAATTTCTACTGTTGTAGATACTTTTAATAATATTATTCTAAAT | forward primer for CRISPRi plasmid repressing purine metabolism |
| $P_{30000}$-crRNA-rev | TAAGAAGCCTGCAAATGCAGGCTTCTTATTTTTATATTTAGAATAATATTATTAAAAGT | reverse primer for CRISPRi plasmid repressing purine metabolism |
| $P_{17370}$-crRNA-for | AATTTCTACTGTTGTAGATTACTGGCTATAAATCCTACCCCAC | forward primer for CRISPRi plasmid repressing glutamate metabolism |
| $P_{17370}$-crRNA-rev | TAAGAAGCCTGCAAATGCAGGCTTCTTATTTTTATGTGGGGTAGGATTTATAGCCAGTA | reverse primer for CRISPRi plasmid repressing glutamate metabolism |
| *birA*-ex-for | CAGTGGTGGTGGTGGTGGTGCTCGAGTTAAATATATTTATCTAAAC | forward primer used for BirA purification |
| *birA*-ex-rev | GCCTGGTGCCGCGCGGCAGCCATATGATGAAACATTATGAAGTTC | reverse primer used for BirA purification |
| *gssR*-ex-for | GGTGGTGCCTCGAGTTAATTTTGTTCTCTAAAAGAATATAC | forward primer used for GssR purification |
| *gssR*-ex-rev | CTGGTGCCGCGCGGCAGCCATATG | reverse primer used for GssR |

| | | |
|---|---|---|
| | ATGGAGAATGTTGACAAC | purification |
| CAC1850-381, 382s-IBS | GCTCGAGATAATTATCCTTAGTTTTCGATGACGTGCGCCCAGATAGGGTG | Targetron primer for CAC1850 |
| EBS universal primer | CGAAATTAGAAACTTGCGTTCAGTAAAC | universal primer |
| CAC1850-381，382s-EBS2 | TGAACGCAAGTTTCTAATTTCGATTAAAACTCGATAGAGGAAAGTGTCT | Targetron primer for CAC1850 |
| CAC1850-381，382s-EBS1d | CAGATTGTACAAATGTGGTGATAACAGATAAGTCGATGACGTTAACTTACCTTTCTTTGT | Targetron primer for CAC1850 |
| Cbei1890-357，358s-IBS primer | TGCTCGAGATAATTATCCTTAAACATCCGTGCAGTGCGCCCAGATAGGGTG | Targetron primer for Cbei1890 |
| Cbei1890-357，358s-EBS2 primer | TGAACGCAAGTTTCTAATTTCGGTTATGTTCCGATAGAGGAAAGTGTCT | Targetron primer for Cbei1890 |
| Cbei1890-357，358s-EBS1d primer | AGATTGTACAAATGTGGTGATAACAGATAAGTCCGTGCAACTAACTTACCTTTCTTTGT | Targetron primer for Cbei1890 |
| qRT-16720-for | CAACAGGGAGATACAATACA | forward qRT-PCR primer for CLJU_c16720 |
| qRT-16720-rev | TACCAATTTCGGTAACACTA | reverse qRT-PCR primer for CLJU_c16720 |
| qRT-15260-for | ATACAAGCTGCATTATTCTC | forward qRT-PCR primer for CLJU_c15260 |
| qRT-15260-rev | CATACATCACTTAGCAAGGA | reverse qRT-PCR primer for CLJU_c15260 |
| qRT-21480-for | AAAGCCTTCCAAGTTATGAT | forward qRT-PCR primer for CLJU_c21480 |
| qRT-21480-rev | GATTTGAACAGTCCAAGAGG | reverse qRT-PCR primer for CLJU_c21480 |
| qRT-39590-for | AGTATTGTCATTTCAAGGTG | forward qRT-PCR primer for CLJU_c39590 |
| qRT-39590-rev | AAAAGTTTCCCTATTGTGGT | reverse qRT-PCR primer for CLJU_c39590 |
| qRT-16510-for | ACTTTCACAGGTGGTAATGG | forward qRT-PCR primer for CLJU_c16510 |
| qRT-16510-rev | TTAATGTCGGCACTTTCATC | reverse qRT-PCR primer for CLJU_c16510 |
| qRT-28160-for | GTTTCGTTGGTAGTTGGTGT | forward qRT-PCR primer for CLJU_c28160 |
| qRT-28160-rev | GGTAGTGGCAATACGCTGTC | reverse qRT-PCR primer for |

| | | |
|---|---|---|
| | | CLJU_c28160 |
| qRT-19400-for | ATAGAATTACACCGTTTAGG | forward qRT-PCR primer for CLJU_c19400 |
| qRT-19400-rev | TCACAGTCATTGATGCAGGT | reverse qRT-PCR primer for CLJU_c19400 |
| qRT-30460-for | ATAGAATTACACCGTTTAGG | forward qRT-PCR primer for CLJU_c30460 |
| qRT-30460-rev | GATCTATATTCTTCAAAACCAACAG TATGATC | reverse qRT-PCR primer for CLJU_c30460 |
| qRT-30450-for | GGTACAAATACCACAGAATGTCAT CC | forward qRT-PCR primer for CLJU_c30450 |
| qRT-30450-rev | CTTTGAAATCCTCAAAATTCTCAGT TC | reverse qRT-PCR primer for CLJU_c30450 |
| qRT-29580-for | TCAGTAGTAGCGGTCATCTG | forward qRT-PCR primer for CLJU_c29580 |
| qRT-29580-rev | TAAAAGCTTAGGCACTTTTC | reverse qRT-PCR primer for CLJU_c29580 |
| qRT-37350-for | ATGTAACCCATTCGTTCACC | forward qRT-PCR primer for CLJU_c37350 |
| qRT-37350-rev | ATGTAACCCATTCGTTCACC | reverse qRT-PCR primer for CLJU_c37350 |
| qRT-21500-for | AAATCATCAAGGTGCCCATC | forward qRT-PCR primer for CLJU_c21500 |
| qRT-21500-rev | ATGTAGCTGCATCTTCGTAT | reverse qRT-PCR primer for CLJU_c21500 |
| qRT-30440-for | AGCATTGTTTTCGGGTATTG | forward qRT-PCR primer for CLJU_c30440 |
| qRT-30440-rev | TTCCAGCTAAAAGGCCAACC | reverse qRT-PCR primer for CLJU_c30440 |
| qRT-16690-for | TCCAAAATAGTAGAACCAAC | forward qRT-PCR primer for CLJU_c16690 |
| qRT-16690-rev | CTTTAAAATCCTGAAGTGAT | reverse qRT-PCR primer for CLJU_c16690 |
| qRT-13740-for | GATACAAAGAAAGCTGAACG | forward qRT-PCR primer for CLJU_c13740 |
| qRT-13740-rev | GCTCCTTATTAATCCAATAT | reverse qRT-PCR primer for CLJU_c13740 |
| qRT-28830-for | ACAATATCTCCAGGAACCCT | forward qRT-PCR primer for CLJU_c28830 |
| qRT-28830-rev | GTTCATCTCCACCTTTCTCC | reverse qRT-PCR primer for CLJU_c28830 |
| qRT-16780-for | TCAAGTGGATACTCAAAATG | forward qRT-PCR primer for |

| | | |
|---|---|---|
| | | CLJU_c16780 |
| qRT-16780-rev | CACCTTCTTTAAAATCTGTG | reverse qRT-PCR primer for CLJU_c16780 |
| qRT-13550-for | AAGACCTGCAACTCTATTAG | forward qRT-PCR primer for CLJU_c13550 |
| qRT-13550-rev | TACTGCTAGTGATTCATCAT | reverse qRT-PCR primer for CLJU_c13550 |
| qRT-00300-for | AAACATGGATGGATACGTTC | forward qRT-PCR primer for CLJU_c00300 |
| qRT-00300-rev | CCAGTATCTTTTGCATTACC | reverse qRT-PCR primer for CLJU_c00300 |
| qRT-05590-for | ATGAAATTTGGTAAGTTTAAAT | forward qRT-PCR primer for CLJU_c05590 |
| qRT-05590-rev | TCAAACACACTTTTTAAAAAC | reverse qRT-PCR primer for CLJU_c05590 |
| qRT-29900-for | ATGGAATAAAAGCTCTGC | forward qRT-PCR primer for CLJU_c29900 |
| qRT-29900-rev | TGTCTCGTCCCAACTAAG | reverse qRT-PCR primer for CLJU_c29900 |
| qRT-29910-for | GCTTGTAGATAAGGATGG | forward qRT-PCR primer for CLJU_c29910 |
| qRT-29910-rev | AGTAAATGGCACCAGAAC | reverse qRT-PCR primer for CLJU_c29910 |
| qRT-29920-for | TTGTAGTGGCTGGTGGTA | forward qRT-PCR primer for CLJU_c29920 |
| qRT-29920-rev | TATAGGTACATGCTGCTC | reverse qRT-PCR primer for CLJU_c29920 |
| qRT-29930-for | GTTAACTGGAGTAAAAGA | forward qRT-PCR primer for CLJU_c29930 |
| qRT-29930-rev | TTTGTATTTCTCAACCCT | reverse qRT-PCR primer for CLJU_c29930 |
| qRT-29940-for | TAGAGCAAGAGCTAAAAT | forward qRT-PCR primer for CLJU_c29940 |
| qRT-29940-rev | AGGTCCTACAACGAGAAG | reverse qRT-PCR primer for CLJU_c29940 |
| qRT-29950-for | AGTGGACATACCCTCCTT | forward qRT-PCR primer for CLJU_c29950 |
| qRT-29950-rev | GAGGCAACTCCTTCAAAA | reverse qRT-PCR primer for CLJU_c29950 |
| qRT-29960-for | ACAGCCATTCAGATGTAG | forward qRT-PCR primer for CLJU_c29960 |
| qRT-29960-rev | AAGCCTCTTACTGTCTCC | reverse qRT-PCR primer for |

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| | | CLJU_c29960 |
| qRT-29970-for | TTATGGGTGCGGTTATGG | forward qRT-PCR primer for CLJU_c29970 |
| qRT-29970-rev | GTCCGAAACTGTTTGATTAGC | reverse qRT-PCR primer for CLJU_c29970 |
| qRT-29980-for | ATAAATTCGGCTATACCAC | forward qRT-PCR primer for CLJU_c29980 |
| qRT-29980-rev | AATGATGAGGATAGGAGC | reverse qRT-PCR primer for CLJU_c29980 |
| qRT-29990-for | TGGTGACGTAGTTGCTAA | forward qRT-PCR primer for CLJU_c29990 |
| qRT-29990-rev | TAAACCTAATTTCCTTGC | reverse qRT-PCR primer for CLJU_c29990 |
| qRT-30000-for | TTAGGTGATGGTGGTTGG | forward qRT-PCR primer for CLJU_c30000 |
| qRT-30000-rev | AGTCCATGTATCCGAAGC | reverse qRT-PCR primer for CLJU_c30000 |
| qRT-17370-for | GAGGAAATAGAAACTGGATG | forward qRT-PCR primer for CLJU_c17370 |
| qRT-17370-rev | CATAAGTGCATGTGGTAGGG | reverse qRT-PCR primer for CLJU_c17370 |
| qRT-17380-for | CTCTGTGAAGGCTCTTGTAC | forward qRT-PCR primer for CLJU_c17380 |
| qRT-17380-rev | AGATGGTCCTGAACCTACTA | reverse qRT-PCR primer for CLJU_c17380 |
| qRT-28670-for | ATGCTCGAAGCAAGGTTA | forward qRT-PCR primer for CLJU_c28670 |
| qRT-28670-rev | GTCCAGGATTTTCACTATTT | reverse qRT-PCR primer for CLJU_c28670 |
| qRT-28690-for | GAGAAGGGCCATTTCCAG | forward qRT-PCR primer for CLJU_c28690 |
| qRT-28690-rev | GAAGGCCACTTTGCATCA | reverse qRT-PCR primer for CLJU_c28690 |
| qRT-28710-for | TTGCCGCACTTGGATTAG | forward qRT-PCR primer for CLJU_c28710 |
| qRT-28710-rev | TAGCTGCACCACCGATTA | reverse qRT-PCR primer for CLJU_c28710 |
| qRT-28720-for | TAGAGGAATGTGGAGCAG | forward qRT-PCR primer for CLJU_c28720 |
| qRT-28720-rev | AACGTCCTACAGCAATAA | reverse qRT-PCR primer for CLJU_c28720 |
| qRT-28730-for | GTTAAAGCTGCAAAAGAA | forward qRT-PCR primer for |

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| | | CLJU_c28730 |
| qRT-28730-rev | TGCTCATAAGAACGATTA | reverse qRT-PCR primer for CLJU_c28730 |
| qRT-28740-for | GCTAAGGGTGAAACAGGA | forward qRT-PCR primer for CLJU_c28740 |
| qRT-28740-rev | CATTTGCACCGTATCTGT | reverse qRT-PCR primer for CLJU_c28740 |
| qRT-28750-for | ACTTGACTATGCTTATCTT | forward qRT-PCR primer for CLJU_c28750 |
| qRT-28750-rev | TTGTATTTACTGACCCAC | reverse qRT-PCR primer for CLJU_c28750 |
| *rho*-for | AGATAGTGCAAGGGGAGTAC | forward qRT-PCR primer for *rho* |
| *rho*-rev | ACTTTACCGCAAACTTCATC | reverse qRT-PCR primer for *rho* |
| EMSA-37350-for | AGCCAGTGGCGATAAGGTTTTATTCACAGTGTGTATG | forward primer for EMSA |
| EMSA-37350-rev | AGCCAGTGGCGATAAGCAAGAGCCCCTATAATTACT | reverse primer for EMSA |
| EMSA-13550-for | AGCCAGTGGCGATAAGGCATTATAGTTTCTAAGCAAAG | forward primer for EMSA |
| EMSA-13550-rev | AGCCAGTGGCGATAAGGTAAAATTACAATTGTAATCGTAATG | reverse primer for EMSA |
| EMSA-08930-for | AGCCAGTGGCGATAAGTTTTACAGAAAAGAGCCACT | forward primer for EMSA |
| EMSA-08930-rev | AGCCAGTGGCGATAAGGCTCAGCTCTCTTAATTTTC | reverse primer for EMSA |
| EMSA-37390-for | AGCCAGTGGCGATAAGCGATATTGATTTTCTGTATAAAG | forward primer for EMSA |
| EMSA-37390-rev | AGCCAGTGGCGATAAGGTAATCCATCCCCTTTTATAA | reverse primer for EMSA |
| EMSA-30000-for | AGCCAGTGGCGATAAGAGCCAGTGGCGATAAGTATCAGTTCCCCCTTATTAT | forward primer for EMSA |
| EMSA-30000-rev | AGCCAGTGGCGATAAGCCAAAATCATAAAAATGTAT | reverse primer for EMSA |