Table S1: Oligonucleotides used in this study.

| Name | Sequence (5’ to 3’) | Description |
|------|---------------------|-------------|
| **Oligonucleotides for gene deletions** | | |
| SD180 | ACCGCTCGAGAATCCGAGCTTTGTTCAAAAGCCGAGC | brnQ1 markerless deletion, forward primer for upstream region with SalI site |
| SD181 | GAAAAACAACCTCTAATCTACTTTTCTTTCCTCTCTTTATTTT | brnQ1 markerless deletion, reverse primer for upstream region, overlapping primer |
| SD182 | AAGAAGGAGAAAGAAATGTAAGTAGAGTTGTGTTT | brnQ1 markerless deletion, forward primer for downstream region, overlapping primer |
| SD183 | CGGGATCCGAAAAACTGCATTCGCACAATAATCGCAAAGC | brnQ1 markerless deletion, reverse primer for downstream region with BamHI site |
| SD208 | CCCGTTCTGTAAGTATCCACCAATATGTTG | Forward primer for brnQ1 deletion mutant check |
| SD209 | GGTAAATAGTCAGCATCTACCCCTGC | Reverse primer for brnQ1 deletion mutant check |
| SD1 | CCCAAGCTTCTCTCTCTATTGCTTGTGAGCATCG | brnQ2 markerless deletion, forward primer for upstream region with HindIII site |
| SD2 | AGGATTTTCTTATATGTAAGAAAAGCAGCAAGCATGAG | brnQ2 markerless deletion, reverse primer for upstream region, overlapping primer |
| SD3 | GCTTGGCTCTTTTCTTACATAAAGAAATCTCCCCTCTGTGTTTTTCTT | brnQ2 markerless deletion, forward primer for downstream region, overlapping primer |
| SD4 | CCGGAATTCTACTAGTCGAACCTAACGCATTACCTAGACA | brnQ2 markerless deletion, reverse primer for downstream region with EcoRI site |
| SD5 | GGAGTGTCTATTTTAGATCATTAACATGTAATCCCG | Forward primer for brnQ2 deletion mutant check |
| SD6 | GCAACCTATATATACAAAGCTAAAGGTGTATCC | Reverse primer for brnQ2 deletion mutant check |
| NB114 | CTTAGTGCAGGTTAGTTAGCACTGTGATTGAGTTC | brnQ3 markerless deletion, forward primer for upstream region with SalI site |
| NB115 | GGAAAAACAATGCCATCTTCTAAAYAAATCCTCCAAAAGGGAAGTTTCTTAC | brnQ3 markerless deletion, reverse primer for upstream region, overlapping primer |
| NB116 | TTAGGATGCTTCTGTTTTTTCTCCTCTTTCTATATCTATTG | brnQ3 markerless deletion, forward primer for downstream region, overlapping primer |
| NB117 | CTAGATGCTGAGATTGCAAGATTATATATCCTCCCAGAGACAGG | brnQ3 markerless deletion, reverse primer for downstream region with PstI site |
| SD7 | CTAAATGTAAGTGAACCGGAACACAGGCCT | Forward primer for brnQ3 deletion mutant check |
| SD8 | CGAATAATACATCCCATTGCAGCCATTTCC | Reverse primer for brnQ3 deletion mutant check |
| SD186 | ACCGCTCGAGGTTCAATTCAAGGTTAGCATGAGCAGCATTCCTTACTGCGGAGCATTCAAAAGCCGAGC | brnQ4 markerless deletion, forward primer for upstream region with SalI site |
| SD187 | AAAAAGGAGCCGCTCATCAGTTTCTTTCTTCTTGCTATGAC | brnQ4 markerless deletion, reverse primer for upstream region, overlapping primer |
| SD188 | CCAATGAAAGCATGTTAGCGGCGCTTTTCATTITTTTAAAGGG | brnQ4 markerless deletion, forward primer for downstream region, overlapping primer |
| SD189 | CGGGATCCGCTGATTGTTGATGCATTCTTATGACTGCAGGC | brnQ4 markerless deletion, reverse primer for downstream region with BamHI site |
| SD190 | GAAGTCGAAACGATAGGTAACATGCAAAAGCC | Forward primer for *brnQ4* deletion mutant check |
|-------|----------------------------------|-----------------------------------------------|
| SD191 | CATCACCTGCTTCCAGTACTCCTCCTAATAC | Reverse primer for *brnQ4* deletion mutant check |
| NB130 | CTTAGTGACACCCGTAATAAAACCCAACCTT | *brnQ5* markerless deletion, forward primer for upstream region with SalI site |
| NB131 | GGAATGGTTATGTAATATTATTTTTATTCATACCATTGCTGG | *brnQ5* markerless deletion, reverse primer for upstream region, overlapping primer |
| NB132 | AATAATTTTACAACACCTCCTCCGATTATAATTTTT | *brnQ5* markerless deletion, forward primer for downstream region, overlapping primer |
| NB133 | CTAATCGAGCCAATAGGATTTTATCGGATGAGGAACAAAC | *brnQ5* markerless deletion, reverse primer for downstream region with PstI site |
| SD9  | ACGTAAAGACCAACCTACCTAGATAG | Forward primer for *brnQ5* deletion mutant check |
| SD10 | GTGTATATGTTTATAGAAGCCATGGCCAG | Reverse primer for *brnQ5* deletion mutant check |
| NB118 | CTTAGTCGACGCATCAAAAGCAAAAAAGAACCATGGAATGTTGAGG | *brnQ6* markerless deletion, forward primer for upstream region with SalI site |
| NB119 | GAGGTTAGAAGATGATTAAAGAGAGGCTTCTATATAATGGAAGTCCTTT | *brnQ6* markerless deletion, reverse primer for upstream region, overlapping primer |
| NB120 | TTTCATCATTCTCTACCTCTCTAAATTATTTTTAAATTTAACC | *brnQ6* markerless deletion, forward primer for downstream region, overlapping primer |
| NB121 | CTATCGAGAACGAGCATTACCTGAGCAGTTGAAGATATGATTTGACACA | *brnQ6* markerless deletion, reverse primer for downstream region with PstI site |
| SD11 | CGTATGCGCATTCAAAGAAAAAGCTAGCATACATACG | Forward primer for *brnQ6* deletion mutant check |
| SD12 | GAAAGTGGCGAGACATTACACAGCTGAAAGTAAATT | Reverse primer for *brnQ6* deletion mutant check |
| SD100 | AACTGCAGGGAGTGATGGAGATGAGAACATATTATGAGCAAGATGCC | *ilvD* markerless deletion, forward primer for upstream region with PstI site |
| SD101 | TCCTAATTTATGACTCAATCTTCTGGTCAATATCTCCCTTACATAC | *ilvD* markerless deletion, reverse primer for upstream region, overlapping primer |
| SD102 | GGGATGGAAAGATGGAGTCAATATAAAAGAGATAGGATGG | *ilvD* markerless deletion, forward primer for downstream region, overlapping primer |
| SD103 | CGGCCATCTCTCCTTATCAGGAAATTTCTCTTAAACAGCCTTACGGAATG | *ilvD* markerless deletion, reverse primer for downstream region with BamHI site |
| SD104 | ATACCGCAGAGGGTTGGGATTATGTAACC | Forward primer for *ilvD* deletion mutant check |
| SD105 | CGCTGGCACAACACAAACACCCCTTTTGG | Reverse primer for *ilvD* deletion mutant check |
| M13 F | TGTAAAAAGCAGGGCCAG | Forward primer for clone checking, for pHY304 vector backbone |
| M13 R | GGAACACGCTATGACCAGT | Reverse primer for clone checking, for pHY304 vector backbone |

Oligonucleotides for cloning.
| Campus | Primer Sequence | Function |
|--------|----------------|----------|
| SD196  | CGGGATCCATGAAATATTGTTACAGAAAAAAGAAATTTACTTATTAGTTATGTTATTC | Forward primer for brnQ1 cloning with BamHI site |
| SD197  | ACACGCTCGACTTTTTATCATCATCATCTTATAATCTCTCTTTTCTTGAAAAACAAAATAAGTAAACCAATAC | Reverse primer for brnQ1 cloning with SalI site, FLAG tagged |
| SD198  | ACGGCATCGACTTTTCTCTTTATGAAACAAAAACTAAGTAAACCAATAC | Reverse primer for brnQ1 cloning with SalI site |
| SD199  | GGGATTGTGGATTGCAAATTCGCTTCTCG | Sequencing primer for brnQ1 clone check |
| SD61   | CAGGATCATCGCTACAACTTTAAAAAACCACTGAAGTAAACCAATAC | Forward primer for brnQ2 cloning with BamHI site |
| SD58   | ACGGCATCGACTTTTTATCATCATCATCTTATAATCTCTTCTTGAGTTTGAAACAAAATAAGTAAACCAATAC | Reverse primer for brnQ2 cloning with SalI site, FLAG tagged |
| SD145  | ACGGCTCGACTTTTTTTATGAAACAACTGCGCGTTTCTCCTG | Reverse primer for brnQ2 cloning with SalI site |
| SD46   | TTGCAACAGTATTTACAATATGAGTCTCTG | Sequencing forward primer for brnQ2 clone check |
| SD45   | CGATTGAAAAGATAAATGATAGCG | Sequencing reverse primer for brnQ2 clone check |
| SD62   | CAGGATCATCGACTTTTTATCATCATCATCTTATAATCTCTTCTTGAGTTTGAAACAAAATAAGTAAACCAATAC | Forward primer for brnQ3 cloning with BamHI site |
| SD56   | ACGGCATCGACTTTTTTTATGAAACAACTGCGCGTTTCTCCTCAGAGATT | Reverse primer for brnQ3 cloning with SalI site, FLAG tagged |
| SD146  | ACGGCTCGACTTTTTTTATGAAACAACTGCGCGTTTCTCCTCAGAGATT | Reverse primer for brnQ3 cloning with SalI site |
| SD48   | TATCCAATTGCAATCGACTTGTTC | Sequencing forward primer for brnQ3 clone check |
| SD47   | GACCAATGGCAATGTATACAACTAC | Sequencing reverse primer for brnQ3 clone check |
| SD200  | CAGGATCATCGACTTTTTTTATGAAACAACTGCGCGTTTCTCCTCAGAGATT | Forward primer for brnQ4 cloning with BamHI site |
| SD201  | ACGGCATCGACTTTTTTTATGAAACAACTGCGCGTTTCTCCTCAGAGATT | Reverse primer for brnQ4 cloning with SalI site, FLAG tagged |
| SD202  | ACGGCATCGACTTTTTTTATGAAACAACTGCGCGTTTCTCCTCAGAGATT | Reverse primer for brnQ4 cloning with SalI site |
| SD203  | CGATGGATCGCAATATTAGTGCACTTTGTATTG | Sequencing primer for brnQ4 clone check |
| SD204  | CAGGATCATCGACTTTTTTTATGAAACAACTGCGCGTTTCTCCTCAGAGATT | Forward primer for brnQ5 cloning with BamHI site |
| SD205  | ACGGCATCGACTTTTTTTATGAAACAACTGCGCGTTTCTCCTCAGAGATT | Reverse primer for brnQ5 cloning with SalI site, FLAG tagged |
| SD206  | ACGGCATCGACTTTTTTTATGAAACAACTGCGCGTTTCTCCTCAGAGATT | Reverse primer for brnQ5 cloning with SalI site |
| SD207  | CACGACTATTGCTGCTACTCACATTCTTAGG | Sequencing primer for brnQ5 clone check |
| Oligonucleotides for assessing ilv1 and ilv2 operons | Forward primer, checking for upstream of ilv1 operon | Reverse primer, checking for upstream of ilv1 operon | Forward primer for fragment 1 within ilv1 locus | Reverse primer for fragment 1 within ilv1 locus | Forward primer for fragment 2 within ilv1 locus | Reverse primer for fragment 2 within ilv1 locus | Forward primer for fragment 3 within ilv1 locus | Reverse primer for fragment 3 within ilv1 locus | Forward primer for fragment 4 within ilv1 locus | Reverse primer for fragment 4 within ilv1 locus | Forward primer for fragment 5 within ilv1 locus | Reverse primer for fragment 5 within ilv1 locus | Forward primer for fragment 6 within ilv1 locus | Reverse primer for fragment 6 within ilv1 locus | Forward primer for fragment 7 within ilv1 locus | Reverse primer for fragment 7 within ilv1 locus |
|-----|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| SD63 | CGGGATCCATGAAATCATCTTTAAGTTTTGAGATGT | Forward primer for brnQ6 cloning with BamHI site | Reverse primer for brnQ6 cloning with SalI site, FLAG tagged | Reverse primer for brnQ6 cloning with SalI site | Sequencing forward primer for brnQ6 clone check | Sequencing reverse primer for brnQ6 clone check | Forward primer for clone checking, for pAW285 vector backbone | Reverse primer for clone checking, for pAW285 vector backbone |
| Code  | Sequence                          | Description                                                                 |
|-------|-----------------------------------|-----------------------------------------------------------------------------|
| SD339 | GTCATTACAACGAGTACCCACAGA          | Forward primer, checking for downstream of ilv1 operon                      |
| SD340 | CCACTTCTTCAATTAACGTACATTCTTCG     | Reverse primer, checking for downstream of ilv1 operon                      |
| SD120 | GAAACCAGGAAGTGTGACGAAAC           | Forward primer for fragment 1 within ilv2 locus                             |
| SD121 | TGGCCTAGGCTCTAGTTTGATTC           | Reverse primer for fragment 1 within ilv2 locus                             |
| SD122 | GAAAGGATAAGAGCGACAAATGCA          | Forward primer for fragment 2 within ilv2 locus                             |
| SD123 | GCGGAGATTCTCTTTACTTCTGCTG         | Reverse primer for fragment 2 within ilv2 locus                             |
| SD124 | CGAGTACTTACAGAAATTCCAGCAAGG       | Forward primer for fragment 3 within ilv2 locus                             |
| SD125 | ATACGAAGTGCAGCCATCATCATACTAC      | Reverse primer for fragment 3 within ilv2 locus                             |
| SD126 | CGACCAGAAACCAGAAATGAAAC           | Forward primer for fragment 4 within ilv2 locus                             |
| SD127 | CAACCGTTTCTCCATATCATGC           | Reverse primer for fragment 4 within ilv2 locus                             |