Table 1: Phylogenies

Publication-ready versions of both the genome-scale GBDP tree and the 16S rRNA gene sequence tree can be customized and exported either in SVG (vector graphic) or PNG format from within the phylogeny viewers in your TYGS result page. For publications the SVG format is recommended because it is lossless, always keeps its high resolution and can also be easily converted to other popular formats such as PDF or EPS. Please follow the link provided above!

Table 2: Identification

The below list contains the result of the TYGS species identification routine.

Explanation of remarks that might occur in the below table:

**remark [R1]:** The TYGS type strain database is automatically updated on an almost daily basis. However, if a particular type strain genome is not available in the TYGS database, this can have several reasons which are detailed in the FAQ. You can request an extended 16S rRNA gene analysis via the 16S tree viewer found in your result page to detect not yet genome-sequenced type strains relevant for your study.

**remark [R2]:** > 70% dDDH value (formula \(d_4\)) and (almost) minimal dDDH values for gene-content formulae \(d_0\) and \(d_6\) indicate a potentially unreliable identification result and should thus be checked via the 16S rRNA gene sequence similarity. Such strong deviations can, in principle, be caused by sequence contamination.

**remark [R3]:** G+C content difference of > 1 % indicates a potentially unreliable identification result because within species G+C content varies no more than 1 %, if computed from genome sequences (PMID: 24505073).

| Strain         | Conclusion | Identification result               | Remark                  |
|----------------|------------|------------------------------------|-------------------------|
| 'Lc1252CHN'    | belongs to known species | *Lactobacillus crispatus*         |                         |
| 'Lc2029'       | belongs to known species | *Lactobacillus crispatus*         |                         |
| 'LcAB70'       | belongs to known species | *Lactobacillus crispatus*         |                         |
| 'LcCIP104459'  | belongs to known species | *Lactobacillus crispatus*         |                         |
| 'LcCRI4'       | belongs to known species | *Lactobacillus crispatus*         |                         |
| 'LcCRI8'       | belongs to known species | *Lactobacillus crispatus*         |                         |
| 'LcCRI10'      | belongs to known species | *Lactobacillus crispatus*         |                         |
| 'LcCRI17'      | belongs to known species | *Lactobacillus crispatus*         |                         |
| 'LcCTV05'      | belongs to known species | *Lactobacillus crispatus*         |                         |
| 'LcJVV01'      | belongs to known species | *Lactobacillus crispatus*         |                         |
| 'LcMV1AUS'     | belongs to known species | *Lactobacillus crispatus*         |                         |
| 'LcMV3AUS'     | belongs to known species | *Lactobacillus crispatus*         |                         |
| 'LcRL02'       | belongs to known species | *Lactobacillus crispatus*         |                         |
| 'LcRL03'       | belongs to known species | *Lactobacillus crispatus*         |                         |
| 'LcRL05'       | belongs to known species | *Lactobacillus crispatus*         |                         |
| Strain   | Conclusion                  | Identification result       | Remark |
|----------|-----------------------------|-----------------------------|--------|
| 'LcRL06' | belongs to known species    | *Lactobacillus crispatus*   |        |
| 'LcRL07' | belongs to known species    | *Lactobacillus crispatus*   |        |
| 'LcRL08' | belongs to known species    | *Lactobacillus crispatus*   |        |
| 'LcRL09' | belongs to known species    | *Lactobacillus crispatus*   |        |
| 'LcRL10' | belongs to known species    | *Lactobacillus crispatus*   |        |
Table 3: Pairwise comparisons of user genomes vs. type-strain genomes

The following table contains the pairwise dDDH values between your user genomes and the selected type-strain genomes. The dDDH values are provided along with their confidence intervals (C.I.) for the three different GBDP formulas:

- formula \( d_0 \): length of all HSPs divided by total genome length
- formula \( d_4 \): sum of all identities found in HSPs divided by overall HSP length
- formula \( d_6 \): sum of all identities found in HSPs divided by total genome length

**Note:** Formula \( d_4 \) is independent of genome length and is thus robust against the use of incomplete draft genomes. For other reasons for preferring formula \( d_4 \), see the FAQ.

| Query      | Subject      | \( d_0 \) | C.I. \( d_0 \) | \( d_4 \) | C.I. \( d_4 \) | \( d_6 \) | C.I. \( d_6 \) | Diff. G+C Percent |
|------------|--------------|----------|---------------|----------|---------------|----------|---------------|------------------|
| 'LcRL09.fna' | 'LcRL10.fna' | 98.4     | [97.2 - 99.1] | 99.9     | [99.8 - 99.9] | 99.3     | [98.7 - 99.6] | 0.16             |
| 'LcRL02.fna' | 'LcRL10.fna' | 98.7     | [97.7 - 99.2] | 99.9     | [99.8 - 99.9] | 99.4     | [99.0 - 99.7] | 0.11             |
| 'LcRL06.fna' | 'LcRL07.fna' | 99.6     | [99.1 - 99.8] | 99.9     | [99.9 - 100.0] | 99.8     | [99.7 - 99.9] | 0.0              |
| 'LcRL02.fna' | 'LcRL09.fna' | 99.2     | [98.5 - 99.6] | 99.9     | [99.9 - 100.0] | 99.7     | [99.4 - 99.9] | 0.05             |
| 'LcCRI17.fasta' | 'LcRL07.fasta' | 92.4     | [89.5 - 94.5] | 99.5     | [99.2 - 99.7] | 95.6     | [93.8 - 96.9] | 0.07             |
| 'LcCRI17.fasta' | 'LcRL06.fasta' | 92.0     | [89.1 - 94.2] | 99.5     | [99.1 - 99.7] | 95.3     | [93.5 - 96.7] | 0.07             |
| 'LcCRI8.fasta' | 'LcRL07.fasta' | 89.2     | [85.9 - 91.9] | 99.3     | [98.9 - 99.6] | 93.4     | [91.1 - 95.1] | 0.01             |
| 'LcJVV01.fasta' | 'LcMV1AUS.fasta' | 81.7     | [77.8 - 85.1] | 99.2     | [98.7 - 99.5] | 87.6     | [84.6 - 90.1] | 0.02             |
| 'LcCRI8.fasta' | 'LcRL06.fasta' | 88.8     | [85.4 - 91.5] | 99.2     | [98.8 - 99.5] | 93.0     | [90.7 - 94.8] | 0.01             |
| 'LcCRI10.fasta' | 'LcRL06.fasta' | 92.3     | [89.5 - 94.5] | 99.1     | [98.6 - 99.4] | 95.5     | [93.6 - 96.8] | 0.06             |
| 'LcCRI10.fasta' | 'LcRL07.fasta' | 92.8     | [90.0 - 94.8] | 99.1     | [98.6 - 99.4] | 95.7     | [94.0 - 97.0] | 0.06             |
| 'LcRL07.fasta' | 'LcRL08.fasta' | 93.8     | [91.3 - 95.7] | 99.0     | [98.5 - 99.4] | 96.4     | [94.9 - 97.5] | 0.12             |
| 'LcRL06.fasta' | 'LcRL08.fasta' | 93.5     | [90.8 - 95.4] | 99.0     | [98.5 - 99.4] | 96.2     | [94.6 - 97.4] | 0.12             |
| 'LcCRI10.fasta' | 'LcCRI17.fasta' | 93.1     | [90.4 - 95.1] | 98.8     | [98.2 - 99.2] | 95.9     | [94.2 - 97.2] | 0.13             |
| 'LcCRI17.fasta' | 'LcRL08.fasta' | 92.9     | [90.2 - 95.0] | 98.7     | [98.0 - 99.1] | 95.8     | [94.1 - 97.1] | 0.2              |
| 'LcRL05.fasta' | 'LcRL07.fasta' | 81.7     | [77.9 - 85.1] | 98.6     | [98.0 - 99.1] | 87.5     | [84.5 - 90.0] | 0.46             |
| 'LcRL05.fasta' | 'LcRL06.fasta' | 81.2     | [77.3 - 84.6] | 98.6     | [98.0 - 99.1] | 87.1     | [84.0 - 89.6] | 0.46             |
| 'LcCRI17.fasta' | 'LcRL05.fasta' | 87.0     | [83.4 - 89.9] | 98.4     | [97.7 - 98.9] | 91.6     | [89.0 - 93.6] | 0.39             |
| 'LcCRI4.fasta' | 'LcRL02.fasta' | 98.3     | [97.1 - 99.0] | 98.1     | [97.2 - 98.7] | 99.0     | [98.4 - 99.4] | 0.04             |
| 'LcCRI8.fasta' | 'LcCRI17.fasta' | 91.2     | [88.1 - 93.5] | 98.1     | [97.2 - 98.7] | 94.5     | [92.5 - 96.0] | 0.06             |
| 'LcCRI8.fasta' | 'LcRL05.fasta' | 79.9     | [75.9 - 83.3] | 98.1     | [97.3 - 98.7] | 85.8     | [82.7 - 88.5] | 0.45             |
| 'LcCRI4.fasta' | 'LcRL09.fasta' | 98.0     | [96.7 - 98.8] | 98.0     | [97.2 - 98.6] | 98.9     | [98.2 - 99.3] | 0.09             |
| Query          | Subject       | $d_0$ | C.I. $d_0$ | $d_4$ | C.I. $d_4$ | $d_5$ | C.I. $d_5$ | Diff. G+C Percent |
|----------------|---------------|-------|------------|-------|------------|-------|------------|-------------------|
| 'LcCRI4.fasta' | 'LcRL10.fna'  | 97.2  | [95.6 - 98.3] | 97.8  | [96.8 - 98.4] | 98.4  | [97.5 - 99.0] | 0.07              |
| 'LcCRI10.fasta' | 'LcRL08.fna'  | 96.0  | [94.0 - 97.4] | 97.8  | [96.8 - 98.4] | 97.7  | [96.5 - 98.5] | 0.06              |
| 'LcCRI8.fasta' | 'LcRL03.fna'  | 94.2  | [91.7 - 96.0] | 97.7  | [96.7 - 98.4] | 96.5  | [94.9 - 97.6] | 0.14              |
| 'LcCRI17.fasta' | 'LcRL03.fna'  | 82.4  | [78.6 - 85.7] | 97.6  | [96.6 - 98.3] | 87.8  | [84.8 - 90.3] | 0.02              |
| 'LcCRI8.fasta' | 'LcRL03.fna'  | 88.9  | [85.5 - 91.6] | 97.5  | [96.5 - 98.2] | 92.8  | [90.5 - 94.6] | 0.04              |
| 'LcRL03.fna'   | 'LcRL06.fna'  | 84.3  | [80.5 - 87.5] | 97.5  | [96.4 - 98.2] | 89.3  | [86.5 - 91.6] | 0.05              |
| 'LcRL05.fna'   | 'LcRL08.fna'  | 83.6  | [79.8 - 86.8] | 97.4  | [96.4 - 98.2] | 88.7  | [85.8 - 91.1] | 0.58              |
| 'LcRL03.fna'   | 'LcRL07.fna'  | 84.9  | [81.1 - 88.0] | 97.4  | [96.4 - 98.2] | 89.7  | [87.0 - 92.0] | 0.06              |
| 'LcCRI10.fasta' | 'LcRL05.fna'  | 81.7  | [77.8 - 85.0] | 97.2  | [96.1 - 98.0] | 87.2  | [84.1 - 89.7] | 0.52              |
| 'Lc2029.fna'   | 'LcCRI8.fasta' | 95.3  | [93.1 - 96.8] | 97.0  | [95.9 - 97.8] | 97.2  | [95.8 - 98.1] | 0.13              |
| 'LcJVV01.fna'  | 'LcRL02.fna'  | 87.3  | [83.7 - 90.1] | 97.0  | [95.8 - 97.8] | 91.5  | [89.0 - 93.5] | 0.08              |
| 'LcJVV01.fna'  | 'LcRL09.fna'  | 86.6  | [83.0 - 89.6] | 96.9  | [95.7 - 97.8] | 91.0  | [88.4 - 93.1] | 0.03              |
| 'LcCRI4.fasta' | 'LcJVV01.fna' | 89.5  | [86.2 - 92.1] | 96.9  | [95.7 - 97.8] | 93.2  | [90.9 - 94.9] | 0.12              |
| 'Lc2029.fna'   | 'LcRL06.fna'  | 89.8  | [86.6 - 92.4] | 96.8  | [95.6 - 97.7] | 93.4  | [91.1 - 95.1] | 0.14              |
| 'LcAB70.fna'   | 'LcRL06.fna'  | 88.1  | [84.6 - 90.6] | 96.7  | [95.4 - 97.6] | 92.0  | [89.6 - 94.0] | 0.28              |
| 'LcAB70.fna'   | 'LcRL07.fna'  | 88.5  | [85.1 - 91.2] | 96.7  | [95.5 - 97.6] | 92.4  | [90.0 - 94.3] | 0.28              |
| 'Lc2029.fna'   | 'LcRL07.fna'  | 90.2  | [87.0 - 92.7] | 96.7  | [95.5 - 97.6] | 93.6  | [91.4 - 95.3] | 0.14              |
| 'LcJVV01.fna'  | 'LcRL10.fna'  | 85.5  | [81.8 - 88.5] | 96.6  | [95.3 - 97.5] | 90.1  | [87.3 - 92.3] | 0.19              |
| 'LcCRI8.fasta' | 'LcCRI10.fasta' | 94.7  | [92.3 - 96.3] | 96.5  | [95.3 - 97.5] | 96.7  | [95.2 - 97.7] | 0.07              |
| 'LcRL03.fna'   | 'LcRL05.fna'  | 74.1  | [70.1 - 77.7] | 96.5  | [95.3 - 97.5] | 80.5  | [77.1 - 83.5] | 0.4               |
| 'Lc2029.fna'   | 'LcCRI17.fasta' | 91.0  | [87.9 - 93.4] | 96.4  | [95.1 - 97.4] | 94.2  | [92.1 - 95.7] | 0.07              |
| 'LcRL03.fna'   | 'LcRL08.fna'  | 87.2  | [83.7 - 90.1] | 96.3  | [95.0 - 97.3] | 91.4  | [88.8 - 93.4] | 0.18              |
| 'LcAB70.fna'   | 'LcCRI17.fasta' | 86.3  | [82.7 - 89.3] | 96.2  | [94.8 - 97.2] | 90.6  | [88.0 - 92.6] | 0.35              |
| 'LcMV1AUS.fasta' | 'LcRL02.fna'  | 84.8  | [81.1 - 87.9] | 96.0  | [94.7 - 97.1] | 89.5  | [86.6 - 91.7] | 0.1               |
| 'Lc2029.fna'   | 'LcRL08.fna'  | 96.1  | [94.0 - 97.4] | 96.0  | [94.6 - 97.0] | 97.5  | [96.3 - 98.4] | 0.26              |
| 'LcJVV01.fna'  | 'LcMV3AUS.fasta' | 78.3  | [74.4 - 81.6] | 95.9  | [94.5 - 97.0] | 84.1  | [80.9 - 86.9] | 0.16              |
| 'LcMV1AUS.fasta' | 'LcRL09.fna'  | 85.4  | [81.7 - 88.4] | 95.8  | [94.4 - 96.9] | 89.9  | [87.1 - 92.1] | 0.05              |
| Query          | Subject          | $d_0$ | C.I. $d_0$     | $d_s$ | C.I. $d_s$     | $d_t$ | C.I. $d_t$     | Diff. G+C Percent |
|----------------|------------------|-------|----------------|-------|----------------|-------|----------------|-------------------|
| 'Lc2029.fna'   | 'LcRL03.fna'     | 89.6  | [86.3 - 92.2]  | 95.7  | [94.3 - 96.8]  | 93.1  | [90.8 - 94.8]  | 0.09              |
| 'LcAB70.fna'   | 'LcRL08.fna'     | 91.2  | [88.1 - 93.5]  | 95.6  | [94.1 - 96.7]  | 94.2  | [92.1 - 95.7]  | 0.16              |
| 'LcCRI10.fasta'| 'LcRL03.fna'     | 89.2  | [85.9 - 91.8]  | 95.6  | [94.1 - 96.7]  | 92.7  | [90.4 - 94.6]  | 0.11              |
| 'Lc2029.fna'   | 'LcRL05.fna'     | 79.9  | [75.9 - 83.3]  | 95.6  | [94.1 - 96.7]  | 85.4  | [82.2 - 88.1]  | 0.32              |
| 'LcAB70.fna'   | 'LcCRI10.fasta'  | 92.0  | [89.1 - 94.2]  | 95.5  | [94.0 - 96.6]  | 94.7  | [92.8 - 96.2]  | 0.22              |
| 'LcMV1AUS.fna' | 'LcRL10.fna'     | 87.2  | [83.6 - 90.1]  | 95.1  | [93.5 - 96.3]  | 91.1  | [88.5 - 93.2]  | 0.21              |
| 'LcAB70.fna'   | 'LcRL05.fna'     | 76.5  | [72.5 - 80.1]  | 95.1  | [93.5 - 96.3]  | 82.4  | [79.1 - 85.3]  | 0.74              |
| 'Lc2029.fna'   | 'LcCRI10.fasta'  | 97.6  | [96.1 - 98.5]  | 94.8  | [93.1 - 96.0]  | 98.4  | [97.4 - 99.0]  | 0.2               |
| 'LcCRI4.fasta' | 'LcMV1AUS.fna'   | 86.3  | [82.7 - 89.3]  | 94.8  | [93.2 - 96.1]  | 90.4  | [87.7 - 92.6]  | 0.14              |
| 'LcAB70.fna'   | 'LcCRI8.fasta'   | 92.7  | [89.9 - 94.8]  | 94.7  | [93.1 - 96.0]  | 95.1  | [93.2 - 96.5]  | 0.29              |
| 'Lc2029.fna'   | 'LcAB70.fna'     | 91.1  | [88.0 - 93.4]  | 94.7  | [93.1 - 96.0]  | 94.0  | [91.8 - 95.6]  | 0.42              |
| 'LcCRI8.fasta' | 'LcCTV05.fna'    | 78.8  | [74.8 - 82.2]  | 94.6  | [92.9 - 95.9]  | 84.3  | [81.0 - 87.1]  | 0.09              |
| 'LcAB70.fna'   | 'LcRL03.fna'     | 85.5  | [81.8 - 88.6]  | 94.5  | [92.8 - 95.8]  | 89.8  | [87.0 - 92.0]  | 0.33              |
| 'LcCTV05.fna'  | 'LcRL06.fna'     | 80.4  | [76.4 - 83.8]  | 94.4  | [92.6 - 95.7]  | 85.6  | [82.4 - 88.3]  | 0.08              |
| 'LcMV1AUS.fna' | 'LcMV3AUS.fna'   | 80.1  | [76.2 - 83.5]  | 94.4  | [92.7 - 95.7]  | 85.4  | [82.2 - 88.1]  | 0.14              |
| 'LcCTV05.fna'  | 'LcRL07.fna'     | 80.9  | [77.0 - 84.3]  | 94.2  | [92.5 - 95.6]  | 86.0  | [82.9 - 88.6]  | 0.08              |
| 'LcAB70.fna'   | 'LcCTV05.fna'    | 78.2  | [74.2 - 81.7]  | 94.1  | [92.3 - 95.5]  | 83.7  | [80.4 - 86.5]  | 0.2               |
| 'LcCRI17.fasta'| 'LcCTV05.fna'    | 76.0  | [72.0 - 79.6]  | 93.8  | [92.0 - 95.2]  | 81.8  | [78.4 - 84.7]  | 0.15              |
| 'LcMV3AUS.fna' | 'LcRL10.fna'     | 90.1  | [86.8 - 92.6]  | 93.4  | [91.6 - 94.9]  | 93.1  | [90.8 - 94.8]  | 0.35              |
| 'LcMV3AUS.fna' | 'LcRL09.fna'     | 88.1  | [84.6 - 90.9]  | 93.3  | [91.4 - 94.8]  | 91.6  | [89.0 - 93.6]  | 0.2               |
| 'LcMV3AUS.fna' | 'LcRL02.fna'     | 87.5  | [84.0 - 90.4]  | 93.3  | [91.5 - 94.8]  | 91.2  | [88.6 - 93.2]  | 0.25              |
| 'LcCTV05.fna'  | 'LcRL05.fna'     | 67.6  | [63.7 - 71.2]  | 93.2  | [91.3 - 94.7]  | 74.0  | [70.5 - 77.2]  | 0.54              |
| 'Lc1252CHN.fna'| 'LcJV01.fna'     | 71.0  | [67.0 - 74.6]  | 93.1  | [91.2 - 94.7]  | 77.2  | [73.7 - 80.3]  | 0.21              |
| 'Lc2029.fna'   | 'LcCTV05.fna'    | 82.0  | [78.1 - 85.3]  | 92.7  | [90.7 - 94.3]  | 86.7  | [83.6 - 89.3]  | 0.22              |
| 'LcCTV05.fna'  | 'LcRL03.fna'     | 77.0  | [73.0 - 80.5]  | 92.4  | [90.4 - 94.0]  | 82.4  | [79.1 - 85.3]  | 0.13              |
| 'LcCRI4.fasta' | 'LcMV3AUS.fna'   | 88.7  | [85.3 - 91.4]  | 92.3  | [90.3 - 93.9]  | 91.9  | [89.4 - 93.9]  | 0.28              |
| 'LcCTV05.fna'  | 'LcRL08.fna'     | 79.5  | [75.6 - 83.0]  | 92.2  | [90.1 - 93.8]  | 84.5  | [81.3 - 87.3]  | 0.04              |
| Query                   | Subject                  | $d_0$  | C.I. $d_0$ | $d_s$  | C.I. $d_s$ | $d_i$  | C.I. $d_i$ | Diff. G+C Percent |
|------------------------|--------------------------|--------|------------|--------|------------|--------|------------|------------------|
| 'Lc1252CHN.fna'        | 'LcMV1AUS.fna'           | 72.2   | [68.3 - 75.9] | 91.5   | [89.3 - 93.2] | 78.0   | [74.6 - 81.1] | 0.19             |
| 'LcAB70.fna'           | 'LcRL02.fna'             | 86.7   | [83.1 - 89.6] | 91.4   | [89.2 - 93.2] | 90.2   | [87.5 - 92.4] | 0.29             |
| 'LcAB70.fna'           | 'LcRL09.fna'             | 86.5   | [82.9 - 89.5] | 91.4   | [89.3 - 93.2] | 90.1   | [87.4 - 92.3] | 0.34             |
| 'LcCRI10.fasta'        | 'LcCTV05.fasta'          | 84.7   | [81.0 - 87.9] | 91.2   | [89.0 - 93.0] | 88.7   | [85.8 - 91.0] | 0.02             |
| 'LcAB70.fna'           | 'LcRL10.fna'             | 87.9   | [84.4 - 90.7] | 91.1   | [88.9 - 92.9] | 91.1   | [88.5 - 93.2] | 0.18             |
| 'Lc1252CHN.fna'        | 'LcMV3AUS.fna'           | 70.8   | [66.9 - 74.5] | 91.0   | [88.8 - 92.8] | 76.7   | [73.2 - 79.8] | 0.05             |
| 'LcMV3AUS.fna'         | 'LcRL06.fna'             | 78.6   | [74.6 - 82.1] | 90.8   | [88.5 - 92.6] | 83.5   | [80.3 - 86.4] | 0.26             |
| 'Lc2029.fna'           | 'LcRL10.fna'             | 88.8   | [85.4 - 91.5] | 90.7   | [88.5 - 92.6] | 91.8   | [89.2 - 93.7] | 0.24             |
| 'LcMV3AUS.fna'         | 'LcRL07.fna'             | 78.9   | [75.0 - 82.4] | 90.7   | [88.4 - 92.5] | 83.8   | [80.6 - 86.6] | 0.26             |
| 'Lc2029.fna'           | 'LcRL02.fna'             | 86.5   | [82.9 - 89.4] | 90.6   | [88.3 - 92.4] | 89.9   | [87.2 - 92.2] | 0.13             |
| 'Lc1252CHN.fna'        | 'LcCRI4.fasta'           | 77.5   | [73.5 - 81.0] | 90.5   | [88.2 - 92.4] | 82.5   | [79.2 - 85.4] | 0.33             |
| 'Lc2029.fna'           | 'LcRL09.fna'             | 87.1   | [83.6 - 90.0] | 90.5   | [88.2 - 92.3] | 90.4   | [87.7 - 92.6] | 0.08             |
| 'LcCRI8.fasta'         | 'LcRL02.fna'             | 84.4   | [80.7 - 87.6] | 90.4   | [88.1 - 92.3] | 88.3   | [85.4 - 90.7] | 0.0              |
| 'Lc1252CHN.fna'        | 'LcRL02.fna'             | 76.9   | [72.9 - 80.5] | 90.3   | [88.0 - 92.2] | 82.0   | [78.7 - 84.9] | 0.29             |
| 'Lc1252CHN.fna'        | 'LcRL09.fna'             | 77.3   | [73.3 - 80.8] | 90.2   | [87.9 - 92.1] | 82.3   | [79.0 - 85.2] | 0.24             |
| 'LcCRI8.fasta'         | 'LcRL09.fna'             | 84.7   | [81.0 - 87.8] | 90.1   | [87.8 - 92.0] | 88.5   | [85.6 - 90.9] | 0.05             |
| 'Lc1252CHN.fna'        | 'LcRL10.fna'             | 75.5   | [71.5 - 79.1] | 90.1   | [87.8 - 92.0] | 80.7   | [77.4 - 83.7] | 0.4              |
| 'LcJVV01.fna'          | 'LcRL05.fna'             | 62.4   | [58.7 - 66.0] | 90.0   | [87.7 - 91.9] | 68.6   | [65.1 - 71.8] | 0.36             |
| 'LcMV3AUS.fna'         | 'LcRL08.fna'             | 81.4   | [77.5 - 84.8] | 89.8   | [87.5 - 91.7] | 85.8   | [82.6 - 88.4] | 0.38             |
| 'LcMV3AUS.fna'         | 'LcRL03.fna'             | 77.0   | [73.0 - 80.6] | 89.8   | [87.4 - 91.7] | 82.0   | [78.7 - 84.9] | 0.2              |
| 'LcRL02.fna'           | 'LcRL06.fna'             | 87.7   | [84.2 - 90.5] | 89.6   | [87.2 - 91.5] | 90.7   | [88.1 - 92.8] | 0.01             |
| 'LcJVV01.fna'          | 'LcRL08.fna'             | 73.5   | [69.6 - 77.2] | 89.6   | [87.2 - 91.6] | 78.9   | [75.5 - 82.0] | 0.22             |
| 'LcJVV01.fna'          | 'LcRL07.fna'             | 77.8   | [73.8 - 81.3] | 89.6   | [87.3 - 91.6] | 82.6   | [79.3 - 85.5] | 0.1              |
| 'LcCRI8.fasta'         | 'LcRL10.fna'             | 85.4   | [81.7 - 88.4] | 89.6   | [87.2 - 91.5] | 88.9   | [86.0 - 91.2] | 0.11             |
| 'LcRL06.fna'           | 'LcRL10.fna'             | 85.7   | [82.1 - 88.8] | 89.5   | [87.1 - 91.5] | 89.2   | [86.3 - 91.5] | 0.1              |
| 'LcMV1AUS.fna'         | 'LcRL07.fna'             | 72.8   | [68.8 - 76.4] | 89.5   | [87.2 - 91.5] | 78.2   | [74.8 - 81.5] | 0.11             |
| 'LcRL02.fna'           | 'LcRL07.fna'             | 88.3   | [84.8 - 91.0] | 89.5   | [87.2 - 91.5] | 91.2   | [88.6 - 93.2] | 0.01             |
| Query         | Subject               | $d_0$ | C.I. $d_0$ | $d_4$ | C.I. $d_4$ | $d_5$ | C.I. $d_5$ | Diff. G+C Percent |
|---------------|-----------------------|-------|------------|-------|------------|-------|------------|-------------------|
| 'LcAB70.fna'  | 'LcCRI4.fasta'        | 86.5  | [82.9 - 89.5] | 89.5  | [87.1 - 91.5] | 89.8  | [87.1 - 92.1] | 0.25              |
| 'LcCRI10.fasta' | 'LcRL02.fna'         | 86.2  | [82.6 - 89.2] | 89.5  | [87.2 - 91.5] | 89.6  | [86.8 - 91.8] | 0.07              |
| 'Lc2029.fna'  | 'LcMV3AUS.fna'        | 80.6  | [76.7 - 84.0] | 89.5  | [87.1 - 91.5] | 85.0  | [81.8 - 87.7] | 0.12              |
| 'LcRL07.fna'  | 'LcRL10.fna'          | 86.3  | [82.7 - 89.3] | 89.5  | [87.1 - 91.5] | 89.6  | [86.8 - 91.9] | 0.1               |
| 'Lc2029.fna'  | 'LcJVV01.fasta'       | 73.5  | [69.5 - 77.1] | 89.5  | [87.2 - 91.5] | 78.9  | [75.5 - 82.0] | 0.05              |
| 'LcRL07.fna'  | 'LcRL09.fasta'        | 88.7  | [85.3 - 91.4] | 89.4  | [87.1 - 91.4] | 91.5  | [88.9 - 93.5] | 0.06              |
| 'LcCRI10.fasta' | 'LcRL09.fasta'        | 87.0  | [83.4 - 89.9] | 89.4  | [87.0 - 91.4] | 90.1  | [87.4 - 92.3] | 0.12              |
| 'LcRL02.fna'  | 'LcRL03.fasta'        | 79.3  | [75.3 - 82.7] | 89.4  | [87.0 - 91.4] | 83.9  | [80.6 - 86.7] | 0.04              |
| 'LcRL03.fna'  | 'LcRL10.fasta'        | 81.8  | [77.9 - 85.1] | 89.4  | [87.1 - 91.4] | 86.0  | [82.9 - 88.6] | 0.15              |
| 'LcJVV01.fna' | 'LcRL06.fasta'        | 77.1  | [73.1 - 80.7] | 89.4  | [87.0 - 91.4] | 82.0  | [78.7 - 84.9] | 0.09              |
| 'LcRL06.fna'  | 'LcRL09.fasta'        | 88.1  | [84.6 - 90.9] | 89.4  | [87.0 - 91.4] | 91.0  | [88.4 - 93.1] | 0.06              |
| 'LcCRI17.fasta' | 'LcRL02.fasta'        | 81.2  | [77.3 - 84.6] | 89.3  | [86.9 - 91.3] | 85.5  | [82.3 - 88.2] | 0.06              |
| 'LcMV3AUS.fna' | 'LcRL05.fasta'        | 67.7  | [63.9 - 71.4] | 89.3  | [86.9 - 91.3] | 73.6  | [70.1 - 76.8] | 0.2               |
| 'LcMV1AUS.fna' | 'LcRL06.fasta'        | 72.0  | [68.1 - 75.7] | 89.3  | [87.0 - 91.3] | 77.5  | [74.1 - 80.7] | 0.11              |
| 'LcCRI17.fasta' | 'LcMV3AUS.fna'        | 77.0  | [73.0 - 80.5] | 89.2  | [86.9 - 91.2] | 81.9  | [78.5 - 84.8] | 0.19              |
| 'LcJVV01.fna' | 'LcRL03.fasta'        | 67.4  | [63.6 - 71.1] | 89.2  | [86.8 - 91.2] | 73.3  | [69.8 - 76.5] | 0.04              |
| 'LcAB70.fna'  | 'LcMV3AUS.fna'        | 79.7  | [75.7 - 83.1] | 89.2  | [86.8 - 91.2] | 84.2  | [80.9 - 87.0] | 0.54              |
| 'LcCRI10.fasta' | 'LcRL10.fasta'        | 87.9  | [84.4 - 90.7] | 89.1  | [86.7 - 91.1] | 90.8  | [88.1 - 92.9] | 0.04              |
| 'LcCRI8.fasta' | 'LcJVV01.fasta'       | 75.6  | [71.7 - 79.2] | 89.1  | [86.7 - 91.1] | 80.7  | [77.3 - 83.7] | 0.08              |
| 'LcRL03.fna'  | 'LcRL09.fasta'        | 80.8  | [76.9 - 84.2] | 89.1  | [86.7 - 91.1] | 85.1  | [82.0 - 87.8] | 0.01              |
| 'LcCRI8.fasta' | 'LcMV3AUS.fna'        | 77.6  | [73.7 - 81.2] | 89.1  | [86.7 - 91.1] | 82.4  | [79.1 - 85.3] | 0.25              |
| 'LcCRI17.fasta' | 'LcRL09.fasta'        | 81.7  | [77.8 - 85.0] | 89.1  | [86.7 - 91.1] | 85.8  | [82.7 - 88.5] | 0.01              |
| 'LcCRI17.fasta' | 'LcRL10.fasta'        | 82.7  | [78.9 - 86.0] | 88.9  | [86.5 - 91.0] | 86.7  | [83.6 - 89.2] | 0.17              |
| 'Lc2029.fna'  | 'LcCRI4.fasta'        | 87.3  | [83.7 - 90.1] | 88.9  | [86.5 - 90.9] | 90.3  | [87.6 - 92.5] | 0.17              |
| 'Lc1252CHN.fna' | 'LcRL07.fasta'        | 69.8  | [65.8 - 73.4] | 88.9  | [86.5 - 91.0] | 75.4  | [71.9 - 78.6] | 0.31              |
| 'LcCRI10.fasta' | 'LcMV3AUS.fna'        | 81.2  | [77.3 - 84.6] | 88.8  | [86.4 - 90.9] | 85.4  | [82.2 - 88.1] | 0.32              |
| 'LcMV1AUS.fna' | 'LcRL05.fasta'        | 64.8  | [61.0 - 68.5] | 88.8  | [86.4 - 90.9] | 70.7  | [67.3 - 74.0] | 0.35              |
| Query        | Subject            | d₀     | C.I. d₀ | d₄     | C.I. d₄ | d₅     | C.I. d₅ | Diff G+C Percent |
|--------------|--------------------|--------|---------|--------|---------|--------|---------|-----------------|
| 'LcRL08.fna' | 'LcRL10.fna'       | 89.0   | [85.7 - 91.7] | 88.8   | [86.4 - 90.9] | 91.7   | [89.1 - 93.6] | 0.03            |
| 'LcCRI4.fasta' | 'LcCRI8.fasta'    | 84.4   | [80.6 - 87.5] | 88.8   | [86.3 - 90.8] | 88.0   | [85.1 - 90.5] | 0.04            |
| 'LcRL02.fna' | 'LcRL08.fna'       | 86.5   | [82.8 - 89.4] | 88.8   | [86.4 - 90.9] | 89.7   | [86.9 - 91.5] | 0.13            |
| 'Lc1252CHN.fna' | 'LcRL06.fna'    | 69.4   | [65.5 - 73.0] | 88.7   | [86.3 - 90.8] | 75.0   | [71.5 - 78.2] | 0.3             |
| 'LcMV1AUS.fna' | 'LcRL03.fna'      | 72.5   | [68.5 - 76.1] | 88.6   | [86.1 - 90.6] | 77.8   | [74.3 - 80.9] | 0.06            |
| 'LcRL08.fna' | 'LcRL09.fna'       | 87.4   | [83.8 - 90.2] | 88.6   | [86.1 - 90.6] | 90.3   | [87.6 - 92.5] | 0.19            |
| 'LcCRI17.fasta' | 'LcJVV01.fna'    | 74.2   | [70.2 - 77.8] | 88.4   | [85.9 - 90.3] | 79.3   | [75.9 - 82.4] | 0.02            |
| 'LcRL02.fna' | 'LcRL05.fna'       | 74.0   | [70.1 - 77.7] | 88.4   | [86.0 - 90.5] | 79.2   | [75.8 - 82.2] | 0.45            |
| 'LcRL05.fna' | 'LcRL10.fna'       | 72.7   | [68.7 - 76.3] | 88.4   | [86.0 - 90.5] | 77.9   | [74.5 - 81.0] | 0.56            |
| 'LcCTV05.fna' | 'LcRL02.fna'      | 75.0   | [71.0 - 78.6] | 88.4   | [86.0 - 90.5] | 80.0   | [76.6 - 83.0] | 0.09            |
| 'LcRL05.fna' | 'LcRL09.fna'       | 74.8   | [70.8 - 78.4] | 88.3   | [85.9 - 90.4] | 79.9   | [76.5 - 82.9] | 0.4             |
| 'LcCTV05.fna' | 'LcRL09.fna'      | 75.5   | [71.5 - 79.0] | 88.3   | [85.8 - 90.4] | 80.4   | [77.0 - 83.4] | 0.14            |
| 'LcCRI4.fasta' | 'LcRL07.fna'      | 86.8   | [83.2 - 89.7] | 88.2   | [85.7 - 90.3] | 89.8   | [87.0 - 92.0] | 0.02            |
| 'LcCRI10.fasta' | 'LcJVV01.fna'    | 73.9   | [69.9 - 77.5] | 88.2   | [85.7 - 90.3] | 79.0   | [75.6 - 82.1] | 0.15            |
| 'LcAB70.fna' | 'LcJVV01.fna'      | 76.4   | [72.4 - 79.9] | 88.2   | [85.7 - 90.3] | 81.2   | [77.8 - 84.1] | 0.37            |
| 'LcCTV05.fna' | 'LcJVV01.fna'      | 64.5   | [60.7 - 68.1] | 88.2   | [85.7 - 90.3] | 70.3   | [66.8 - 73.5] | 0.17            |
| 'LcCRI4.fasta' | 'LcRL06.fna'      | 86.2   | [82.6 - 89.2] | 88.1   | [85.6 - 90.2] | 89.4   | [86.5 - 91.6] | 0.03            |
| 'LcCRI4.fasta' | 'LcCRI10.fasta'   | 87.1   | [83.5 - 90.0] | 88.0   | [85.4 - 90.1] | 90.0   | [87.3 - 92.2] | 0.03            |
| 'LcCTV05.fna' | 'LcRL10.fna'       | 74.2   | [70.2 - 77.8] | 88.0   | [85.5 - 90.1] | 79.3   | [75.9 - 82.3] | 0.02            |
| 'Lc2029.fna' | 'LcMV1AUS.fna'     | 78.6   | [74.6 - 82.1] | 87.9   | [85.4 - 90.1] | 83.1   | [79.8 - 85.9] | 0.03            |
| 'Lc1252CHN.fna' | 'LcRL08.fna'      | 71.9   | [68.0 - 75.6] | 87.8   | [85.2 - 89.9] | 77.2   | [73.7 - 80.3] | 0.43            |
| 'LcMV1AUS.fna' | 'LcRL08.fna'      | 79.4   | [75.5 - 82.9] | 87.7   | [85.1 - 89.8] | 83.7   | [80.5 - 86.6] | 0.24            |
| 'LcCRI4.fasta' | 'LcRL08.fna'      | 86.7   | [83.1 - 89.6] | 87.7   | [85.2 - 89.9] | 89.7   | [86.9 - 91.9] | 0.1             |
| 'LcCRI4.fasta' | 'LcRL05.fna'       | 73.7   | [69.7 - 77.3] | 87.7   | [85.2 - 89.8] | 78.7   | [75.3 - 81.8] | 0.48            |
| 'LcCRI4.fasta' | 'LcCRI17.fasta'   | 80.8   | [76.8 - 84.2] | 87.7   | [85.2 - 89.9] | 84.9   | [81.7 - 87.6] | 0.1             |
| 'Lc1252CHN.fna' | 'Lc2029.fna'      | 71.8   | [67.8 - 75.4] | 87.6   | [85.1 - 89.8] | 77.0   | [73.6 - 80.2] | 0.16            |
| 'Lc1252CHN.fna' | 'LcRL03.fna'      | 63.5   | [59.7 - 67.1] | 87.6   | [85.1 - 89.8] | 69.3   | [65.8 - 72.5] | 0.25            |
| Query       | Subject           | $d_0$ | C.I. $d_0$ | $d_4$ | C.I. $d_4$ | $d_s$ | C.I. $d_s$ | Diff. G+C Percent |
|------------|-------------------|-------|------------|-------|------------|-------|------------|-------------------|
| 'LcCRI8.fasta' | 'LcMV1AUS.fna'    | 79.8  | [75.8 - 83.2] | 87.5  | [85.0 - 89.7] | 84.0  | [80.7 - 86.8] | 0.1               |
| 'LcCRI17.fasta' | 'LcMV1AUS.fna'    | 74.7  | [70.7 - 78.3] | 87.5  | [85.0 - 89.7] | 79.6  | [76.2 - 82.6] | 0.04              |
| 'LcCRI4.fasta' | 'LcRL03.fasta'    | 79.9  | [75.9 - 83.3] | 87.3  | [84.7 - 89.4] | 84.0  | [80.8 - 86.8] | 0.08              |
| 'Lc1252CHN.fna' | 'LcRL05.fasta'    | 61.9  | [58.2 - 65.4] | 87.1  | [84.5 - 89.3] | 67.6  | [64.2 - 70.8] | 0.15              |
| 'LcCTV05.fasta' | 'LcMV1AUS.fna'    | 64.2  | [60.5 - 67.9] | 86.7  | [84.1 - 88.9] | 69.8  | [66.4 - 73.1] | 0.19              |
| 'Lc1252CHN.fna' | 'LcCRI17.fasta'   | 67.8  | [63.9 - 71.4] | 86.6  | [84.0 - 88.9] | 73.2  | [69.7 - 76.4] | 0.23              |
| 'LcAB70.fasta' | 'LcMV1AUS.fna'    | 78.1  | [74.1 - 81.6] | 86.6  | [84.0 - 88.8] | 82.4  | [79.1 - 85.3] | 0.39              |
| 'Lc1252CHN.fna' | 'LcCRI8.fasta'    | 73.8  | [69.8 - 77.4] | 86.5  | [83.8 - 88.7] | 78.6  | [75.2 - 81.7] | 0.29              |
| 'LcCRI4.fasta' | 'LcCTV05.fasta'   | 75.8  | [71.8 - 79.4] | 86.5  | [83.9 - 88.8] | 80.4  | [77.0 - 83.4] | 0.05              |
| 'LcCTV05.fasta' | 'LcMV3AUS.fna'    | 69.5  | [65.6 - 73.1] | 86.4  | [83.7 - 88.6] | 74.7  | [71.3 - 77.9] | 0.34              |
| 'LcCRI10.fasta' | 'LcMV1AUS.fna'    | 78.3  | [74.3 - 81.8] | 86.4  | [83.8 - 88.7] | 82.5  | [79.2 - 85.4] | 0.17              |
| 'Lc1252CHN.fna' | 'LcCRI10.fasta'   | 71.5  | [67.6 - 75.2] | 86.4  | [83.8 - 88.7] | 76.6  | [73.1 - 79.7] | 0.36              |
| 'Lc1252CHN.fna' | 'LcAB70.fasta'    | 76.5  | [72.5 - 80.0] | 84.6  | [81.8 - 87.0] | 80.7  | [77.3 - 83.7] | 0.58              |
| 'Lc1252CHN.fna' | 'LcCTV05.fasta'   | 62.2  | [58.4 - 65.8] | 84.3  | [81.5 - 86.7] | 67.5  | [64.1 - 70.7] | 0.38              |
| 'LcCIP104459.fasta' | 'Lactobacillus crispatus JCM 1185' | 80.3  | [76.4 - 83.7] | 81.6  | [78.7 - 84.2] | 83.5  | [80.2 - 86.3] | 0.21              |
| 'LcCIP104459.fasta' | 'LcJVV01.fasta'   | 64.8  | [61.0 - 68.4] | 79.3  | [76.4 - 82.0] | 69.2  | [65.8 - 72.5] | 0.1               |
| 'LcCIP104459.fasta' | 'LcRL02.fasta'    | 71.8  | [67.8 - 75.4] | 79.2  | [76.2 - 81.8] | 75.6  | [72.2 - 78.8] | 0.18              |
| 'LcCIP104459.fasta' | 'LcMV1AUS.fasta'  | 65.5  | [61.7 - 69.1] | 79.1  | [76.2 - 81.8] | 69.9  | [66.4 - 73.1] | 0.08              |
| 'LcCIP104459.fasta' | 'LcRL09.fasta'    | 71.3  | [67.3 - 74.9] | 79.1  | [76.1 - 81.8] | 75.2  | [71.7 - 78.4] | 0.13              |
| 'LcCIP104459.fasta' | 'LcRL10.fasta'    | 69.9  | [65.9 - 73.5] | 78.8  | [75.8 - 81.4] | 73.8  | [70.3 - 77.0] | 0.29              |
| 'LcCIP104459.fasta' | 'LcMV3AUS.fasta'  | 63.0  | [59.3 - 66.6] | 78.7  | [75.7 - 81.4] | 67.4  | [64.0 - 70.7] | 0.07              |
| 'LcAB70.fasta' | 'LcCIP104459.fasta' | 70.1  | [66.2 - 73.7] | 78.6  | [75.7 - 81.3] | 74.0  | [70.5 - 77.2] | 0.47              |
| 'LcCIP104459.fasta' | 'LcCRI4 fasta'   | 69.1  | [65.2 - 72.7] | 78.5  | [75.6 - 81.2] | 73.1  | [69.6 - 76.3] | 0.21              |
| 'LcCIP104459.fasta' | 'LcRL06.fasta'    | 67.5  | [63.6 - 71.1] | 78.4  | [75.5 - 81.1] | 71.6  | [68.1 - 74.8] | 0.19              |
| 'LcCIP104459.fasta' | 'LcRL07.fasta'    | 68.2  | [64.3 - 71.8] | 78.4  | [75.4 - 81.1] | 72.2  | [68.7 - 75.4] | 0.19              |
| 'LcCIP104459.fasta' | 'LcRL03.fasta'    | 62.9  | [59.2 - 66.5] | 78.3  | [75.3 - 81.0] | 67.3  | [63.9 - 70.5] | 0.14              |
| 'Lc1252CHN.fasta' | 'LcCIP104459.fasta' | 63.5  | [59.7 - 67.1] | 78.2  | [75.2 - 80.9] | 67.8  | [64.4 - 71.0] | 0.11              |
| Query                  | Subject                     | $d_0$ | C.I. $d_0$ | $d_1$ | C.I. $d_1$ | $d_2$ | C.I. $d_2$ | Diff. G+C Percent |
|-----------------------|-----------------------------|-------|------------|-------|------------|-------|------------|-------------------|
| 'LcCIP104459.fna'     | 'LcCRI17.fasta'             | 65.1  | [61.3 - 68.7] | 78.1  | [75.1 - 80.8] | 69.3  | [65.9 - 72.6] | 0.12              |
| 'LcCIP104459.fna'     | 'LcRL05.fna'                | 59.6  | [55.9 - 63.1] | 78.1  | [75.1 - 80.8] | 64.1  | [60.7 - 67.3] | 0.27              |
| 'Lc2029.fna'          | 'LcCIP104459.fna'           | 67.4  | [63.6 - 71.1] | 78.0  | [75.0 - 80.7] | 71.5  | [68.0 - 74.7] | 0.05              |
| 'LcCIP104459.fna'     | 'LcCRI10.fasta'             | 67.1  | [63.3 - 70.8] | 78.0  | [75.1 - 80.8] | 71.2  | [67.7 - 74.4] | 0.25              |
| 'LcCIP104459.fna'     | 'LcRL08.fasta'              | 69.3  | [65.4 - 73.0] | 77.8  | [74.9 - 80.6] | 73.2  | [69.7 - 76.4] | 0.31              |
| 'LcCIP104459.fna'     | 'LcCRI8.fasta'              | 70.5  | [66.5 - 74.1] | 77.7  | [74.8 - 80.5] | 74.2  | [70.7 - 77.4] | 0.18              |
| 'LcRL07.fna'          | Lactobacillus crispatus     | 66.3  | [62.4 - 69.9] | 77.5  | [74.6 - 80.3] | 70.3  | [66.9 - 73.5] | 0.4               |
| 'LcRL06.fna'          | Lactobacillus crispatus     | 65.8  | [61.9 - 69.4] | 77.2  | [74.2 - 79.9] | 69.8  | [66.3 - 73.0] | 0.4               |
| 'LcCIP104459.fna'     | 'LcCTV05.fasta'             | 58.3  | [54.7 - 61.8] | 76.7  | [73.7 - 79.5] | 62.6  | [59.3 - 65.8] | 0.27              |
| 'LcMV3AUS.fna'        | Lactobacillus crispatus     | 62.4  | [58.7 - 66.0] | 76.6  | [73.6 - 79.4] | 66.6  | [63.2 - 69.8] | 0.15              |
| 'Lc2029.fna'          | Lactobacillus crispatus     | 65.7  | [61.9 - 69.4] | 76.5  | [73.5 - 79.3] | 69.6  | [66.2 - 72.9] | 0.26              |
| 'LcRL08.fna'          | Lactobacillus crispatus     | 68.0  | [64.1 - 71.6] | 76.4  | [73.4 - 79.1] | 71.7  | [68.2 - 74.9] | 0.53              |
| 'LcJVV01.fna'         | Lactobacillus crispatus     | 64.0  | [60.2 - 67.6] | 76.2  | [73.2 - 79.0] | 68.0  | [64.6 - 71.2] | 0.31              |
| 'Lc1252CHN.fna'       | Lactobacillus crispatus     | 67.2  | [63.3 - 70.8] | 76.2  | [73.2 - 78.9] | 70.9  | [67.4 - 74.1] | 0.1               |
| 'LcCRI17.fasta'       | Lactobacillus crispatus     | 64.3  | [60.5 - 67.9] | 76.1  | [73.1 - 78.8] | 68.2  | [64.8 - 71.4] | 0.33              |
| 'LcAB70.fasta'        | Lactobacillus crispatus     | 69.9  | [66.0 - 73.5] | 76.1  | [73.1 - 78.9] | 73.4  | [69.9 - 76.6] | 0.68              |
| 'LcRL03.fna'          | Lactobacillus crispatus     | 59.9  | [56.2 - 63.5] | 76.0  | [73.0 - 78.8] | 64.0  | [60.7 - 67.3] | 0.35              |
| 'LcRL05.fna'          | Lactobacillus crispatus     | 58.7  | [55.1 - 62.2] | 76.0  | [73.0 - 78.7] | 62.9  | [59.6 - 66.1] | 0.06              |
| 'LcCRI8.fasta'        | Lactobacillus crispatus     | 69.4  | [65.5 - 73.1] | 75.7  | [72.7 - 78.5] | 72.9  | [69.4 - 76.1] | 0.39              |
| 'LcCRI10.fasta'       | Lactobacillus crispatus     | 67.3  | [63.4 - 71.0] | 75.5  | [72.5 - 78.3] | 70.9  | [67.5 - 74.2] | 0.46              |
| 'LcMV1AUS.fna'        | Lactobacillus crispatus     | 66.7  | [62.9 - 70.4] | 75.4  | [72.3 - 78.1] | 70.4  | [66.9 - 73.6] | 0.29              |
| 'LcRL10.fna'          | Lactobacillus crispatus     | 68.5  | [64.7 - 72.2] | 75.2  | [72.2 - 78.0] | 72.0  | [68.5 - 75.2] | 0.5               |
| 'LcRL02.fna'          | Lactobacillus crispatus     | 70.3  | [66.4 - 73.9] | 75.1  | [72.1 - 77.9] | 73.6  | [70.1 - 76.6] | 0.39              |
| 'LcRL09.fna'          | Lactobacillus crispatus     | 70.8  | [66.8 - 74.4] | 74.9  | [71.9 - 77.7] | 74.0  | [70.5 - 77.2] | 0.34              |
| 'LcCRI4.fasta'        | Lactobacillus crispatus     | 69.7  | [65.8 - 73.3] | 74.7  | [71.7 - 77.5] | 73.0  | [69.5 - 76.2] | 0.43              |
| 'LcCTV05.fna'         | Lactobacillus crispatus     | 57.8  | [54.2 - 61.3] | 74.6  | [71.6 - 77.4] | 61.8  | [58.5 - 65.0] | 0.48              |
| 'Lc2029.fna'          | Lactobacillus gallinarum    | 27.7  | [24.3 - 31.3] | 25.5  | [23.2 - 28.0] | 26.1  | [23.2 - 29.2] | 0.38              |
| Query          | Subject                                      | $d_0$ | C.I. $d_0$ | $d_4$ | C.I. $d_4$ | $d_i$ | C.I. $d_i$ | Diff. G+C Percent |
|----------------|----------------------------------------------|-------|------------|-------|------------|-------|------------|------------------|
| 'LcCTV05.fna'  | Lactobacillus gallinarum JCM 2011            | 28.3  | [25.0 - 32.0] | 25.1  | [22.7 - 27.5] | 26.5  | [23.6 - 29.6] | 0.6              |
| 'LcCRI8.fasta' | Lactobacillus gallinarum JCM 2011            | 31.8  | [28.5 - 35.4] | 25.1  | [22.7 - 27.5] | 29.2  | [26.3 - 32.3] | 0.5              |
| 'LcCRI17.fasta' | Lactobacillus gallinarum JCM 2011            | 31.5  | [28.1 - 35.1] | 25.1  | [22.8 - 27.5] | 29.0  | [26.0 - 32.1] | 0.44             |
| 'LcAB70.fna'   | Lactobacillus gallinarum JCM 2011            | 32.5  | [29.1 - 36.0] | 25.1  | [22.8 - 27.6] | 29.7  | [26.8 - 32.8] | 0.8              |
| 'LcCRI10.fasta' | Lactobacillus gallinarum JCM 2011            | 31.3  | [27.9 - 34.9] | 25.1  | [22.8 - 27.6] | 28.8  | [25.9 - 31.9] | 0.58             |
| 'LcRL05.fna'   | Lactobacillus kefiranofaciens ATCC 43761     | 29.5  | [26.2 - 33.2] | 25.0  | [22.7 - 27.5] | 27.4  | [24.5 - 30.5] | 0.68             |
| 'LcRL05.fna'   | Lactobacillus gallinarum JCM 2011            | 29.3  | [25.9 - 32.9] | 25.0  | [22.6 - 27.4] | 27.2  | [24.3 - 30.3] | 0.06             |
| 'LcRL03.fasta' | Lactobacillus gallinarum JCM 2011            | 29.2  | [25.9 - 32.8] | 24.9  | [22.5 - 27.3] | 27.2  | [24.3 - 30.3] | 0.46             |
| 'Lc2029.fasta' | Lactobacillus amylolorus DSM 20531           | 28.8  | [25.4 - 32.4] | 24.9  | [22.6 - 27.4] | 26.9  | [24.0 - 30.0] | 0.92             |
| 'LcCRI4.fasta' | Lactobacillus gallinarum JCM 2011            | 32.3  | [28.9 - 35.9] | 24.8  | [22.5 - 27.3] | 29.5  | [26.5 - 32.6] | 0.54             |
| 'LcRL07.fna'   | Lactobacillus gallinarum JCM 2011            | 31.4  | [28.0 - 35.0] | 24.8  | [22.4 - 27.2] | 28.8  | [25.9 - 31.9] | 0.52             |
| 'LcRL06.fna'   | Lactobacillus gallinarum JCM 2011            | 31.3  | [27.9 - 34.8] | 24.8  | [22.5 - 27.3] | 28.7  | [25.8 - 31.8] | 0.52             |
| 'Lc2029.fasta' | Lactobacillus suntoryeus LMG 22464           | 27.6  | [24.2 - 31.2] | 24.8  | [22.4 - 27.2] | 25.8  | [23.0 - 29.0] | 0.33             |
| 'Lc2029.fasta' | Lactobacillus sobrius DSM 16698              | 28.3  | [24.9 - 31.9] | 24.7  | [22.4 - 27.2] | 26.4  | [23.5 - 29.5] | 0.98             |
| 'LcRL08.fasta' | Lactobacillus gallinarum JCM 2011            | 31.0  | [27.7 - 34.6] | 24.6  | [22.3 - 27.1] | 28.5  | [25.6 - 31.6] | 0.64             |
| 'LcCRI4.fasta' | Lactobacillus amylolorus DSM 20531           | 32.2  | [28.8 - 35.7] | 24.6  | [22.3 - 27.1] | 29.3  | [26.4 - 32.4] | 0.76             |
| 'Lc2029.fasta' | Lactobacillus kitasatonis JCM 1039           | 29.0  | [25.6 - 32.6] | 24.6  | [22.3 - 27.1] | 26.9  | [24.0 - 30.0] | 0.66             |
| 'LcCRI17.fasta' | Lactobacillus kefiranofaciens ATCC 43761     | 30.6  | [27.3 - 34.2] | 24.6  | [22.3 - 27.1] | 28.2  | [25.3 - 31.3] | 0.3              |
| 'LcRL02.fasta' | Lactobacillus amylolorus DSM 20531           | 31.3  | [27.9 - 34.9] | 24.5  | [22.2 - 27.0] | 28.7  | [25.7 - 31.8] | 0.79             |
| 'LcCRI17.fasta' | Lactobacillus suntoryeus LMG 22464           | 29.7  | [26.3 - 33.3] | 24.5  | [22.2 - 27.0] | 27.4  | [24.5 - 30.5] | 0.39             |
| 'LcRL07.fasta' | Lactobacillus suntoryeus LMG 22464           | 29.4  | [26.0 - 33.0] | 24.5  | [22.2 - 26.9] | 27.2  | [24.3 - 30.3] | 0.47             |
| 'LcRL09.fasta' | Lactobacillus gallinarum JCM 2011            | 32.3  | [28.9 - 35.9] | 24.5  | [22.2 - 27.0] | 29.4  | [26.5 - 32.5] | 0.46             |
| 'LcCRI10.fasta' | Lactobacillus suntoryeus LMG 22464           | 29.3  | [25.9 - 32.9] | 24.5  | [22.2 - 27.0] | 27.1  | [24.2 - 30.2] | 0.52             |
| 'LcRL10.fasta' | Lactobacillus gallinarum JCM 2011            | 31.4  | [28.1 - 35.0] | 24.5  | [22.2 - 27.0] | 28.7  | [25.8 - 31.9] | 0.61             |
| 'LcRL05.fasta' | Lactobacillus suntoryeus LMG 22464           | 27.5  | [24.1 - 31.1] | 24.5  | [22.2 - 27.0] | 25.7  | [22.9 - 28.8] | 0.01             |
| 'LcCRI10.fasta' | Lactobacillus amylolorus DSM 20531           | 32.3  | [29.0 - 35.9] | 24.5  | [22.2 - 27.0] | 29.4  | [26.5 - 32.5] | 0.73             |
| Query          | Subject                                      | $d_0$ | C.I. $d_0$ | $d_4$ | C.I. $d_4$ | $d_5$ | C.I. $d_5$ | Diff. G+C Percent |
|----------------|----------------------------------------------|-------|------------|-------|------------|-------|------------|-------------------|
| 'LcRL02.fna'   | Lactobacillus gallinarum DSM 20075           | 32.3  | [28.9 - 35.9] | 24.5  | [22.2 - 27.0] | 29.4  | [26.5 - 32.5] | 0.51              |
| 'LcRL09.fna'   | Lactobacillus amylovorus DSM 20531           | 31.6  | [28.2 - 35.2] | 24.5  | [22.2 - 27.0] | 28.9  | [25.9 - 32.0] | 0.85              |
| 'LcRL10.fna'   | Lactobacillus amylovorus DSM 20531           | 31.0  | [27.7 - 34.6] | 24.5  | [22.2 - 27.0] | 28.4  | [25.5 - 31.6] | 0.69              |
| 'LcRL03.fna'   | Lactobacillus amylovorus DSM 20531           | 31.0  | [27.7 - 34.6] | 24.5  | [22.2 - 27.0] | 28.4  | [25.5 - 31.6] | 0.69              |
| 'LcAB70.fna'   | Lactobacillus suntoryeus LMG 22464           | 30.1  | [26.7 - 33.7] | 24.5  | [22.2 - 27.0] | 27.7  | [24.8 - 30.9] | 0.75              |
| 'LcCTV05.fna'  | Lactobacillus amylovorus DSM 20531           | 32.5  | [29.1 - 36.0] | 24.4  | [22.1 - 26.8] | 29.5  | [26.5 - 32.6] | 0.86              |
| 'LcRL06.fna'   | Lactobacillus amylovorus DSM 20531           | 30.1  | [26.7 - 33.7] | 24.5  | [22.2 - 27.0] | 27.7  | [24.8 - 30.9] | 0.75              |
| 'LcRL06.fna'   | Lactobacillus amylovorus DSM 20531           | 29.8  | [26.4 - 33.4] | 24.4  | [22.1 - 26.9] | 27.5  | [24.6 - 30.6] | 0.47              |
| 'LcRL07.fna'   | Lactobacillus amylovorus DSM 20531           | 31.2  | [27.9 - 34.8] | 24.4  | [22.1 - 26.9] | 28.6  | [25.7 - 31.7] | 0.78              |
| 'LcRL05.fna'   | Lactobacillus sobrius DSM 16698              | 28.9  | [25.5 - 32.5] | 24.3  | [22.0 - 26.8] | 26.8  | [23.9 - 29.9] | 1.3               |
| 'LcRL05.fna'   | Lactobacillus amylovorus DSM 20531           | 29.1  | [25.8 - 32.8] | 24.3  | [22.0 - 26.8] | 27.0  | [24.1 - 30.1] | 1.24              |
| 'Lc2029.fna'   | Lactobacillus helveticus DSM 20075           | 25.5  | [22.2 - 29.2] | 24.3  | [22.0 - 26.8] | 24.2  | [21.3 - 27.3] | 0.09              |
| 'LcRL10.fna'   | Lactobacillus helveticus DSM 20075           | 26.2  | [22.9 - 29.9] | 24.3  | [22.0 - 26.8] | 24.7  | [21.9 - 27.8] | 0.33              |
| 'LcCRI4.fasta' | Lactobacillus kitasatonis JCM 1039           | 32.6  | [29.2 - 36.1] | 24.3  | [22.0 - 26.8] | 29.5  | [26.6 - 32.6] | 0.49              |
| 'LcAB70.fna'   | Lactobacillus amylovorus DSM 20531           | 33.0  | [29.6 - 36.6] | 24.3  | [22.0 - 26.8] | 29.9  | [26.9 - 33.0] | 0.5               |
| 'LcRL05.fna'   | Lactobacillus kitasatonis JCM 1039           | 28.6  | [25.2 - 32.2] | 24.3  | [22.0 - 26.8] | 26.6  | [23.7 - 29.7] | 0.97              |
| 'LcRL08.fna'   | Lactobacillus suntoryeus LMG 22464           | 29.7  | [26.4 - 33.4] | 24.3  | [21.9 - 26.7] | 27.4  | [24.5 - 30.5] | 0.59              |
| 'LcCRI8.fasta' | Lactobacillus amylovorus DSM 20531           | 33.0  | [29.6 - 36.5] | 24.3  | [22.0 - 26.8] | 29.8  | [26.9 - 32.9] | 0.8               |
| 'LcRL03.fna'   | Lactobacillus suntoryeus LMG 22464           | 27.7  | [24.3 - 31.3] | 24.3  | [22.0 - 26.8] | 25.9  | [23.0 - 29.0] | 0.41              |
| 'LcCRI4.fasta' | Lactobacillus suntoryeus LMG 22464           | 30.2  | [26.8 - 33.8] | 24.3  | [22.0 - 26.8] | 27.7  | [24.8 - 30.9] | 0.49              |
| 'LcCRI10.fasta' | Lactobacillus sobrius DSM 16698              | 31.6  | [28.2 - 35.2] | 24.3  | [22.0 - 26.7] | 28.8  | [25.9 - 31.9] | 0.78              |
| 'LcCRI10.fasta' | Lactobacillus kitasatonis JCM 1039          | 30.9  | [27.5 - 34.4] | 24.3  | [22.0 - 26.7] | 28.3  | [25.3 - 31.4] | 0.46              |
| 'LcRL07.fna'   | Lactobacillus sobrius DSM 16698              | 30.7  | [27.4 - 34.3] | 24.2  | [21.9 - 26.6] | 28.1  | [25.2 - 31.2] | 0.84              |
| 'LcRL08.fna'   | Lactobacillus amylovorus DSM 20531           | 32.0  | [28.6 - 35.6] | 24.2  | [21.9 - 26.6] | 29.1  | [26.1 - 32.2] | 0.66              |
| 'LcRL06.fna'   | Lactobacillus kitasatonis JCM 1039          | 31.6  | [28.2 - 35.2] | 24.2  | [21.9 - 26.7] | 28.8  | [25.9 - 31.9] | 0.51              |
| 'LcRL09.fna'   | Lactobacillus kitasatonis JCM 1039          | 32.1  | [28.8 - 35.7] | 24.2  | [21.9 - 26.7] | 29.2  | [26.3 - 32.3] | 0.58              |
| 'LcRL10.fna'   | Lactobacillus sobrius DSM 16698              | 31.1  | [27.7 - 34.7] | 24.2  | [21.9 - 26.6] | 28.4  | [25.5 - 31.5] | 0.74              |
| Query       | Subject                               | d₀    | C.I. d₀ | d₄    | C.I. d₄ | d₅    | C.I. d₅ | Diff. G+C Percent |
|-------------|---------------------------------------|-------|---------|-------|---------|-------|---------|-------------------|
| 'LcRL02.fna' | Lactobacillus sobrius DSM 16698       | 31.6  | [28.2 - 35.2] | 24.2  | [21.9 - 26.7] | 28.8  | [25.8 - 31.9] | 0.85              |
| 'LcCRI4.fasta' | Lactobacillus sobrius DSM 16698       | 32.0  | [28.6 - 35.6] | 24.2  | [21.9 - 26.7] | 29.1  | [26.2 - 32.2] | 0.81              |
| 'LcRL02.fna' | Lactobacillus kitasatonis JCM 1039    | 32.3  | [28.9 - 35.8] | 24.2  | [21.9 - 26.7] | 29.3  | [26.3 - 32.4] | 0.53              |
| 'LcJVV01.fna' | Lactobacillus gallinarum JCM 1039     | 31.3  | [27.9 - 34.9] | 24.2  | [21.9 - 26.7] | 28.6  | [25.7 - 31.7] | 0.42              |
| 'LcRL09.fna' | Lactobacillus sobrius DSM 16698       | 31.7  | [28.4 - 35.3] | 24.2  | [21.9 - 26.7] | 28.9  | [26.0 - 32.0] | 0.9               |
| 'LcMV1AUS.fna' | Lactobacillus gallinarum JCM 1039    | 30.2  | [26.9 - 33.8] | 24.2  | [21.9 - 26.7] | 27.8  | [24.9 - 30.9] | 0.4               |
| 'LcRL06.fna' | Lactobacillus sobrius DSM 16698       | 31.2  | [27.8 - 34.8] | 24.2  | [21.9 - 26.7] | 28.5  | [25.6 - 31.6] | 0.84              |
| 'LcRL09.fna' | Lactobacillus suntoryeus LMG 22464    | 30.0  | [26.7 - 33.6] | 24.2  | [21.9 - 26.7] | 27.6  | [24.7 - 30.7] | 0.4               |
| 'LcRL03.fna' | Lactobacillus amylovorus DSM 20531    | 29.7  | [26.4 - 33.3] | 24.2  | [21.9 - 26.7] | 27.4  | [24.5 - 30.5] | 0.84              |
| 'LcAB70.fna' | Lactobacillus sobrius DSM 16698       | 32.7  | [29.3 - 36.2] | 24.2  | [21.9 - 26.7] | 29.6  | [26.6 - 32.7] | 0.56              |
| 'LcRL10.fna' | Lactobacillus suntoryeus LMG 22464    | 29.2  | [25.8 - 32.8] | 24.2  | [21.9 - 26.7] | 27.0  | [24.1 - 30.1] | 0.56              |
| 'LcRL02.fna' | Lactobacillus suntoryeus LMG 22464    | 30.0  | [26.7 - 33.6] | 24.2  | [21.8 - 26.6] | 27.6  | [24.7 - 30.7] | 0.46              |
| 'LcRL07.fna' | Lactobacillus helveticus DSM 20075    | 27.1  | [23.7 - 30.7] | 24.2  | [21.9 - 26.6] | 25.4  | [22.5 - 28.5] | 0.24              |
| 'LcJVV01.fna' | Lactobacillus amylovorus DSM 20531    | 31.3  | [27.9 - 34.8] | 24.2  | [21.9 - 26.7] | 28.5  | [25.6 - 31.6] | 0.88              |
| 'LcRL07.fna' | Lactobacillus kitasatonis JCM 1039    | 31.3  | [27.9 - 34.9] | 24.2  | [21.9 - 26.7] | 28.6  | [25.7 - 31.7] | 0.51              |
| 'LcCRI17.fasta' | Lactobacillus sobrius DSM 16698       | 31.7  | [28.3 - 35.3] | 24.2  | [21.9 - 26.7] | 28.9  | [25.9 - 32.0] | 0.91              |
| 'LcRL05.fna' | Lactobacillus helveticus DSM 20075    | 25.4  | [22.0 - 30.9] | 24.1  | [21.8 - 26.5] | 24.0  | [21.1 - 27.0] | 0.22              |
| 'LcAB70.fna' | Lactobacillus kitasatonis JCM 1039    | 31.4  | [28.1 - 35.0] | 24.1  | [21.8 - 26.5] | 28.6  | [25.7 - 31.7] | 0.23              |
| 'LcRL03.fna' | Lactobacillus helveticus DSM 20075    | 25.2  | [21.9 - 28.9] | 24.1  | [21.8 - 26.6] | 23.9  | [21.0 - 27.0] | 0.18              |
| 'LcMV3AUS.fna' | Lactobacillus kitasatonis JCM 1039  | 30.7  | [27.3 - 34.3] | 24.1  | [21.8 - 26.5] | 28.1  | [25.2 - 31.2] | 0.77              |
| 'Lc1252CHN.fasta' | Lactobacillus amylovorus DSM 20531   | 31.6  | [28.2 - 35.2] | 24.1  | [21.8 - 26.6] | 28.7  | [25.8 - 31.8] | 1.09              |
| 'LcCRI17.fasta' | Lactobacillus kitasatonis JCM 1039  | 30.8  | [27.4 - 34.4] | 24.1  | [21.8 - 26.6] | 28.2  | [25.3 - 31.3] | 0.59              |
| 'LcRL03.fna' | Lactobacillus kitasatonis JCM 1039    | 30.5  | [26.1 - 33.1] | 24.1  | [21.8 - 26.6] | 27.2  | [24.3 - 30.3] | 0.57              |
| 'LcRL03.fna' | Lactobacillus sobrius DSM 16698       | 29.1  | [25.7 - 32.7] | 24.1  | [21.8 - 26.5] | 26.9  | [24.0 - 30.0] | 0.89              |
| 'LcRL09.fna' | Lactobacillus helveticus DSM 20075    | 27.0  | [23.7 - 30.6] | 24.1  | [21.8 - 26.5] | 25.3  | [22.4 - 28.4] | 0.17              |
| 'LcCRI8.fasta' | Lactobacillus helveticus DSM 20075   | 27.1  | [23.7 - 30.7] | 24.1  | [21.8 - 26.5] | 25.3  | [22.5 - 28.4] | 0.22              |
| 'LcCRI8.fasta' | Lactobacillus kitasatonis JCM 1039   | 31.5  | [28.1 - 35.0] | 24.1  | [21.8 - 26.6] | 28.7  | [25.7 - 31.8] | 0.53              |
| Query         | Subject                     | $d_o$ | C.I. $d_o$ | $d_a$ | C.I. $d_a$ | $d_i$ | C.I. $d_i$ | Diff. G+C Percent |
|--------------|-----------------------------|-------|------------|-------|------------|-------|------------|------------------|
| LcJV01.fna   | Lactobacillus kitasatonis   | 32.4  | [29.0 - 35.9] | 24.1  | [21.8 - 26.6] | 29.3  | [26.4 - 32.4] | 0.61             |
| Lc1252CHN.fna| Lactobacillus gallinarum    | 30.9  | [27.5 - 34.5] | 24.1  | [21.8 - 26.6] | 28.2  | [25.3 - 31.4] | 0.21             |
| Lc1252CHN.fna| Lactobacillus kitasatonis   | 32.2  | [28.9 - 35.8] | 24.1  | [21.8 - 26.6] | 29.2  | [26.3 - 32.3] | 0.82             |
| LcRL10.fna   | Lactobacillus kitasatonis   | 31.9  | [28.5 - 35.4] | 24.1  | [21.8 - 26.6] | 29.0  | [26.0 - 32.1] | 0.42             |
| LcCIP104459.fna| Lactobacillus gallinarum   | 35.3  | [31.9 - 38.8] | 24.1  | [21.8 - 26.6] | 31.4  | [28.5 - 34.5] | 0.33             |
| LcCRI8.fasta | Lactobacillus sobrius DSM 16698 | 32.3  | [28.9 - 35.9] | 24.1  | [21.8 - 26.6] | 29.3  | [26.4 - 32.4] | 0.85             |
| LcMV1AUS.fna | Lactobacillus amylovorus DSM 20531 | 30.3  | [26.9 - 33.9] | 24.1  | [21.8 - 26.6] | 27.8  | [24.9 - 30.9] | 0.9              |
| LcCTV05.fna  | Lactobacillus amylovorus DSM 20531 | 29.7  | [26.3 - 33.3] | 24.0  | [21.7 - 26.5] | 27.3  | [24.4 - 30.4] | 0.7              |
| LcRL02.fna   | Lactobacillus helveticus DSM 20075 | 26.8  | [23.4 - 30.4] | 24.0  | [21.7 - 26.5] | 25.1  | [22.2 - 28.2] | 0.22             |
| LcRL06.fna   | Lactobacillus helveticus DSM 20075 | 27.6  | [24.3 - 31.3] | 24.0  | [21.7 - 26.5] | 25.8  | [22.9 - 28.9] | 0.23             |
| LcMV3AUS.fna | Lactobacillus gallinarum DSM 22464 | 30.6  | [27.2 - 34.2] | 24.0  | [21.7 - 26.5] | 28.0  | [25.1 - 31.1] | 0.26             |
| LcMV1AUS.fna | Lactobacillus kitasatonis DSM 1039 | 31.7  | [28.3 - 35.3] | 24.0  | [21.7 - 26.5] | 28.8  | [25.9 - 31.9] | 0.63             |
| LcMV3AUS.fna | Lactobacillus suntorye DSM 22464 | 28.3  | [25.0 - 31.9] | 24.0  | [21.7 - 26.5] | 26.3  | [23.4 - 29.4] | 0.21             |
| LcAB70.fna   | Lactobacillus helveticus DSM 20075 | 26.8  | [23.4 - 30.4] | 24.0  | [21.7 - 26.5] | 25.1  | [22.2 - 28.2] | 0.51             |
| LcMV3AUS.fna | Lactobacillus amylovorus DSM 20531 | 30.3  | [27.0 - 33.9] | 24.0  | [21.7 - 26.5] | 27.8  | [24.9 - 30.9] | 1.04             |
| LcCIP104459.fna| Lactobacillus suntorye DSM 22464 | 31.4  | [28.0 - 35.0] | 24.0  | [21.6 - 26.4] | 28.6  | [25.7 - 31.7] | 0.28             |
| LcMV1AUS.fna | Lactobacillus suntorye DSM 22464 | 28.8  | [25.4 - 32.4] | 24.0  | [21.7 - 26.5] | 26.6  | [23.7 - 29.7] | 0.35             |
| LcCRI17.fasta | Lactobacillus helveticus DSM 20075 | 27.0  | [23.6 - 30.6] | 24.0  | [21.7 - 26.4] | 25.2  | [22.4 - 28.3] | 0.16             |
| LcRL08.fna   | Lactobacillus kitasatonis DSM 1039 | 31.8  | [28.4 - 35.4] | 24.0  | [21.7 - 26.5] | 28.9  | [26.0 - 32.0] | 0.39             |
| LcJV01.fna   | Lactobacillus suntorye DSM 22464 | 29.5  | [26.1 - 33.1] | 24.0  | [21.7 - 26.5] | 27.1  | [24.2 - 30.2] | 0.37             |
| LcCRI4.fasta | Lactobacillus helveticus DSM 20075 | 27.0  | [23.6 - 30.6] | 24.0  | [21.7 - 26.5] | 25.3  | [22.4 - 28.4] | 0.26             |
| LcRL08.fna   | Lactobacillus helveticus DSM 20075 | 26.9  | [23.5 - 30.5] | 24.0  | [21.7 - 26.5] | 25.2  | [22.3 - 28.3] | 0.36             |
| LcCRI10.fasta | Lactobacillus helveticus DSM 20075 | 26.7  | [23.4 - 30.4] | 24.0  | [21.7 - 26.5] | 25.0  | [22.2 - 28.2] | 0.29             |
| LcRL08.fna   | Lactobacillus sobrius DSM 16698 | 31.3  | [27.9 - 34.9] | 24.0  | [21.7 - 26.5] | 28.5  | [25.6 - 31.6] | 0.71             |
| Lc1252CHN.fna| Lactobacillus suntorye DSM 22464 | 29.1  | [25.7 - 32.7] | 23.9  | [21.6 - 26.4] | 26.8  | [23.9 - 29.9] | 0.16             |
| LcMV1AUS.fna | Lactobacillus helveticus DSM 20075 | 26.0  | [22.7 - 29.6] | 23.9  | [21.6 - 26.4] | 24.5  | [21.6 - 27.6] | 0.12             |
| LcJV01.fna   | Lactobacillus helveticus DSM 20075 | 26.5  | [23.2 - 30.2] | 23.9  | [21.6 - 26.4] | 24.9  | [22.0 - 28.0] | 0.14             |
| Query                  | Subject                                      | d₀   | C.L. d₀ | d₄   | C.L. d₄ | d₅   | C.L. d₅ | Diff. G+C Percent |
|----------------------|----------------------------------------------|------|---------|------|---------|------|---------|------------------|
| 'LcMV3AUS.fna'       | Lactobacillus helveticus DSM 20075           | 25.9 | [22.6 - 29.6] | 23.9 | [21.6 - 26.3] | 24.4 | [21.6 - 27.5] | 0.02             |
| 'LcJVV01.fna'        | Lactobacillus sobrius DSM 16698              | 30.9 | [27.5 - 34.5] | 23.9 | [21.6 - 26.3] | 28.2 | [25.2 - 31.3] | 0.93             |
| 'Lc1252CHN.fna'      | Lactobacillus helveticus DSM 20075           | 26.3 | [23.0 - 30.0] | 23.9 | [21.6 - 26.4] | 24.7 | [21.9 - 27.8] | 0.07             |
| 'LcCIP104459.fna'    | Lactobacillus helveticus DSM 20075           | 28.1 | [24.7 - 31.7] | 23.9 | [21.6 - 26.4] | 24.5 | [21.6 - 27.6] | 0.36             |
| 'Lc2029.fna'         | Lactobacillus kefiranofaciens ATCC 43761     | 26.0 | [22.7 - 29.7] | 23.8 | [21.5 - 26.2] | 25.3 | [22.4 - 28.4] | 0.43             |
| 'LcCTV05.fna'        | Lactobacillus kitasatonis JCM 1039           | 27.0 | [23.7 - 30.7] | 23.8 | [21.5 - 26.2] | 25.3 | [22.4 - 28.4] | 0.43             |
| 'LcCTV05.fna'        | Lactobacillus sobrius DSM 16698              | 28.7 | [25.3 - 32.3] | 23.8 | [21.5 - 26.3] | 26.5 | [23.7 - 29.7] | 0.76             |
| 'LcRL07.fna'         | Lactobacillus kefiranofaciens ATCC 43761     | 27.5 | [24.1 - 31.1] | 23.7 | [21.4 - 26.2] | 25.6 | [22.7 - 28.7] | 0.22             |
| 'LcMV1AUS.fna'       | Lactobacillus sobrius DSM 16698              | 30.3 | [26.9 - 33.9] | 23.7 | [21.4 - 26.2] | 27.7 | [24.8 - 30.8] | 0.95             |
| 'Lc1252CHN.fna'      | Lactobacillus sobrius DSM 16698              | 31.0 | [27.6 - 34.6] | 23.7 | [21.4 - 26.2] | 28.2 | [25.3 - 31.3] | 1.14             |
| 'LcCTV05.fna'        | Lactobacillus helveticus DSM 20075           | 24.5 | [21.2 - 28.1] | 23.7 | [21.4 - 26.2] | 23.2 | [20.4 - 26.3] | 0.31             |
| 'LcMV3AUS.fna'       | Lactobacillus sobrius DSM 16698              | 30.2 | [26.8 - 33.8] | 23.7 | [21.4 - 26.2] | 27.6 | [24.7 - 30.7] | 1.1              |
| 'LcCRI10.fasta'      | Lactobacillus kefiranofaciens ATCC 43761     | 27.9 | [24.6 - 31.6] | 23.6 | [21.3 - 26.1] | 25.9 | [23.0 - 29.0] | 0.17             |
| 'Lc2029.fna'         | Lactobacillus ultunensis DSM 16047           | 25.9 | [22.6 - 29.6] | 23.6 | [21.3 - 26.1] | 24.4 | [21.5 - 27.5] | 0.92             |
| 'Lc2029.fna'         | Lactobacillus acidophilus NBRC 13951         | 25.8 | [22.5 - 29.5] | 23.6 | [21.3 - 26.1] | 24.3 | [21.4 - 27.4] | 2.25             |
| 'Lc2029.fna'         | Lactobacillus kefiranofaciens subsp. kefirgranum JCM 8572 | 26.3 | [22.9 - 29.9] | 23.6 | [21.3 - 26.1] | 24.6 | [21.8 - 27.7] | 0.57             |
| 'LcRL07.fna'         | Lactobacillus kefiranofaciens subsp. kefirgranum JCM 8572 | 27.8 | [24.4 - 31.4] | 23.6 | [21.3 - 26.1] | 25.8 | [22.9 - 28.9] | 0.43             |
| 'LcCIP104459.fna'    | Lactobacillus sobrius DSM 16698              | 32.8 | [29.4 - 36.4] | 23.6 | [21.3 - 26.1] | 29.5 | [26.6 - 32.6] | 1.03             |
| 'LcCRI17.fasta'      | Lactobacillus kefiranofaciens subsp. kefirgranum JCM 8572 | 28.1 | [24.7 - 31.7] | 23.6 | [21.3 - 26.0] | 26.0 | [23.1 - 29.1] | 0.6              |
| 'LcCIP104459.fna'    | Lactobacillus amylovorus DSM 20531           | 33.5 | [30.1 - 37.1] | 23.6 | [21.3 - 26.1] | 30.0 | [27.1 - 33.1] | 0.97             |
| 'LcCRI8.fasta'       | Lactobacillus kefiranofaciens ATCC 43761     | 28.6 | [25.3 - 32.3] | 23.6 | [21.3 - 26.0] | 26.4 | [23.5 - 29.5] | 0.24             |
| 'LcCTV05.fna'        | Lactobacillus kefiranofaciens subsp. kefirgranum JCM 8572 | 24.4 | [21.1 - 28.1] | 23.5 | [21.2 - 25.9] | 23.2 | [20.3 - 26.3] | 0.35             |
| 'LcCIP104459.fna'    | Lactobacillus kitasatonis JCM 1039           | 35.6 | [32.2 - 39.1] | 23.5 | [21.2 - 26.0] | 31.5 | [28.5 - 34.5] | 0.7              |
| 'LcRL05.fna'         | Lactobacillus ultunensis DSM 16047           | 26.4 | [23.1 - 30.1] | 23.5 | [21.2 - 25.9] | 24.7 | [21.9 - 27.8] | 0.6              |
| Query         | Subject                                      | $d_0$ | C.I. $d_0$ | $d_4$ | C.I. $d_4$ | $d_5$ | C.I. $d_5$ | Diff. G+C Percent |
|--------------|----------------------------------------------|-------|------------|-------|------------|-------|------------|-----------------|
| 'LcRL03.fna' | Lactobacillus kefiranofaciens ATCC 43761     | 26.1  | [22.8 - 29.8] | 23.5  | [21.2 - 26.0] | 24.5  | [21.6 - 27.6] | 0.28            |
| 'LcRL05.fna' | Lactobacillus kefiranofaciens subsp. kefirgranum JCM 8572 | 26.9  | [23.6 - 30.6] | 23.5  | [21.2 - 25.9] | 25.1  | [22.2 - 28.2] | 0.89            |
| 'LcCRI10.fasta' | Lactobacillus kefiranofaciens subsp. kefirgranum JCM 8572 | 27.6  | [24.3 - 31.3] | 23.5  | [21.2 - 26.0] | 25.7  | [22.8 - 28.8] | 0.37            |
| 'LcAB70.fna' | Lactobacillus kefiranofaciens ATCC 43761     | 28.8  | [25.5 - 32.4] | 23.5  | [21.2 - 26.0] | 26.6  | [23.7 - 29.7] | 0.06            |
| 'LcRL07.fna' | Lactobacillus ultunensis DSM 16047           | 28.1  | [24.7 - 31.7] | 23.5  | [21.2 - 26.0] | 26.0  | [23.1 - 29.1] | 1.06            |
| 'LcCTV05.fasta' | Lactobacillus kefiranofaciens ATCC 43761     | 25.1  | [21.8 - 28.8] | 23.5  | [21.2 - 26.0] | 23.7  | [20.9 - 26.8] | 0.14            |
| 'LcRL06.fna' | Lactobacillus kefiranofaciens ATCC 43761     | 27.8  | [24.4 - 31.4] | 23.5  | [21.2 - 26.0] | 25.8  | [22.9 - 28.9] | 0.22            |
| 'LcRL08.fna' | Lactobacillus ultunensis DSM 16047           | 27.8  | [24.4 - 31.4] | 23.4  | [21.1 - 25.8] | 25.7  | [22.8 - 28.8] | 0.1             |
| 'LcRL02.fna' | Lactobacillus ultunensis DSM 16047           | 28.4  | [25.1 - 32.1] | 23.4  | [21.1 - 25.8] | 26.2  | [23.3 - 29.3] | 1.05            |
| 'LcAB70.fna' | Lactobacillus acidophilus NBRC 13951         | 28.8  | [25.5 - 32.4] | 23.4  | [21.1 - 25.9] | 26.5  | [23.6 - 29.6] | 2.68            |
| 'LcRL06.fna' | Lactobacillus kefiranofaciens subsp. kefirgranum JCM 8572 | 28.1  | [24.7 - 31.7] | 23.4  | [21.1 - 25.9] | 26.0  | [23.1 - 29.1] | 0.43            |
| 'LcRL07.fna' | Lactobacillus acidophilus NBRC 13951         | 27.9  | [24.5 - 31.5] | 23.4  | [21.2 - 25.9] | 25.8  | [22.9 - 28.9] | 2.4             |
| 'LcCRI4.fasta' | Lactobacillus acidophilus NBRC 13951         | 29.4  | [26.1 - 33.0] | 23.4  | [21.1 - 25.8] | 27.0  | [24.1 - 30.1] | 2.42            |
| 'LcAB70.fna' | Lactobacillus kefiranofaciens subsp. kefirgranum JCM 8572 | 28.5  | [25.1 - 32.1] | 23.4  | [21.1 - 25.9] | 26.3  | [23.4 - 29.4] | 0.15            |
| 'LcCRI8.fasta' | Lactobacillus kefiranofaciens subsp. kefirgranum JCM 8572 | 28.5  | [25.1 - 32.1] | 23.4  | [21.1 - 25.9] | 26.3  | [23.4 - 29.4] | 0.44            |
| 'LcRL03.fna' | Lactobacillus kefiranofaciens subsp. kefirgranum JCM 8572 | 26.3  | [23.0 - 29.9] | 23.4  | [21.1 - 25.8] | 24.6  | [21.7 - 27.7] | 0.48            |
| 'LcCRI4.fasta' | Lactobacillus kefiranofaciens ATCC 43761     | 28.5  | [25.1 - 32.1] | 23.4  | [21.1 - 25.9] | 26.3  | [23.4 - 29.4] | 0.2             |
| 'LcRL10.fna' | Lactobacillus acidophilus NBRC 13951         | 28.5  | [25.2 - 32.1] | 23.4  | [21.1 - 25.8] | 26.3  | [23.4 - 29.4] | 2.49            |
| 'LcRL09.fna' | Lactobacillus ultunensis DSM 16047           | 28.3  | [24.9 - 31.9] | 23.4  | [21.1 - 25.9] | 26.1  | [23.3 - 29.2] | 1.0             |
| 'LcRL06.fna' | Lactobacillus ultunensis DSM 16047           | 28.8  | [25.4 - 32.4] | 23.4  | [21.1 - 25.9] | 26.5  | [23.6 - 29.6] | 1.06            |
| 'LcRL10.fna' | Lactobacillus ultunensis DSM 16047           | 27.9  | [24.6 - 31.5] | 23.4  | [21.1 - 25.9] | 25.8  | [23.0 - 28.9] | 1.16            |
| 'LcRL02.fna' | Lactobacillus acidophilus NBRC 13951         | 29.3  | [25.9 - 32.9] | 23.3  | [21.0 - 25.8] | 26.9  | [24.0 - 30.0] | 2.38            |
| 'LcRL06.fna' | Lactobacillus acidophilus NBRC 13951         | 28.7  | [25.3 - 32.3] | 23.3  | [21.0 - 25.7] | 26.4  | [23.5 - 29.5] | 2.4             |
| Query                  | Subject                                                                 | \( d_0 \) | C.I. \( d_0 \) | \( d_a \) | C.I. \( d_a \) | \( d_s \) | C.I. \( d_s \) | Diff G+C Percent |
|-----------------------|-------------------------------------------------------------------------|-----------|----------------|-----------|----------------|-----------|----------------|-----------------|
| 'LcJVV01.fna'         | Lactobacillus acidophilus NBRC 13951                                   | 29.2      | [25.8 - 32.8]  | 23.3      | [21.0 - 25.8]  | 26.8      | [23.9 - 29.9]  | 2.3             |
| 'LcRL08.fna'          | Lactobacillus kefiranofaciens DSM 16047                                | 28.0      | [24.6 - 31.6]  | 23.3      | [21.0 - 25.7]  | 25.9      | [23.0 - 29.0]  | 0.31            |
| 'LcRL08.fna'          | Lactobacillus acidophilus DSM 16047                                    | 28.1      | [24.8 - 31.8]  | 23.3      | [21.0 - 25.7]  | 26.0      | [23.1 - 29.1]  | 2.52            |
| 'LcRL03.fna'          | Lactobacillus kefiranofaciens subsp. kefirgranum JCM 8572              | 27.1      | [23.7 - 30.7]  | 23.3      | [21.0 - 25.7]  | 25.2      | [22.3 - 28.3]  | 1.01            |
| 'LcRL02.fna'          | Lactobacillus kefiranofaciens ATCC 43761                               | 27.8      | [24.5 - 31.4]  | 23.3      | [21.0 - 25.8]  | 25.8      | [22.9 - 28.9]  | 0.23            |
| 'LcCRI17.fasta'       | Lactobacillus ultunensis DSM 16047                                    | 28.1      | [24.7 - 31.7]  | 23.3      | [21.0 - 25.8]  | 25.9      | [23.0 - 29.0]  | 0.99            |
| 'LcCRI17.fasta'       | Lactobacillus acidophilus DSM 16047                                    | 27.9      | [24.6 - 31.6]  | 23.3      | [21.0 - 25.7]  | 25.8      | [23.0 - 29.0]  | 2.32            |
| 'LcRL05.fna'          | Lactobacillus acidophilus DSM 16047                                    | 26.4      | [23.1 - 30.1]  | 23.3      | [21.0 - 25.7]  | 24.7      | [21.8 - 27.8]  | 1.94            |
| 'LcMV1AUS.fna'        | Lactobacillus acidophilus DSM 16047                                    | 28.8      | [25.4 - 32.4]  | 23.3      | [21.0 - 25.7]  | 26.5      | [23.6 - 29.6]  | 2.28            |
| 'LcMV3AUS.fna'        | Lactobacillus acidophilus DSM 16047                                    | 27.8      | [24.5 - 31.5]  | 23.3      | [21.0 - 25.7]  | 25.8      | [22.9 - 28.9]  | 2.14            |
| 'LcCRI4.fasta'        | Lactobacillus kefiranofaciens subsp. kefirgranum JCM 8572              | 28.6      | [25.2 - 32.2]  | 23.3      | [21.0 - 25.8]  | 26.3      | [23.4 - 29.4]  | 0.4             |
| 'LcCRI4.fasta'        | Lactobacillus ultunensis DSM 16047                                     | 28.8      | [25.5 - 32.4]  | 23.3      | [21.0 - 25.8]  | 26.5      | [23.6 - 29.6]  | 1.08            |
| 'LcCRI10.fasta'       | Lactobacillus ultunensis DSM 16047                                     | 28.2      | [24.8 - 31.8]  | 23.3      | [21.0 - 25.7]  | 26.0      | [23.2 - 29.2]  | 1.12            |
| 'LcCIP104459.fna'     | Lactobacillus ultunensis DSM 16047                                     | 29.8      | [26.5 - 33.4]  | 23.3      | [21.0 - 25.8]  | 27.2      | [24.3 - 30.4]  | 0.87            |
| 'LcRL10.fasta'        | Lactobacillus kefiranofaciens ATCC 43761                                | 27.7      | [24.3 - 31.3]  | 23.3      | [21.0 - 25.8]  | 25.6      | [22.8 - 28.8]  | 0.13            |
| 'LcRL09.fasta'        | Lactobacillus kefiranofaciens ATCC 43761                                | 28.3      | [24.9 - 31.9]  | 23.3      | [21.0 - 25.8]  | 26.1      | [23.2 - 29.2]  | 0.29            |
| 'LcCRI8.fasta'        | Lactobacillus acidophilus DSM 16047 (ATCC 43761)                        | 28.5      | [25.2 - 32.2]  | 23.3      | [21.0 - 25.8]  | 26.3      | [23.4 - 29.4]  | 2.38            |
| 'LcCRI8.fasta'        | Lactobacillus ultunensis DSM 16047                                     | 28.7      | [25.3 - 32.3]  | 23.3      | [21.0 - 25.7]  | 26.4      | [23.5 - 29.5]  | 1.05            |
| 'LcCRI10.fasta'       | Lactobacillus acidophilus DSM 16047                                    | 28.1      | [24.8 - 31.7]  | 23.3      | [21.0 - 25.8]  | 26.0      | [23.1 - 29.1]  | 2.45            |
| 'LcRL02.fna'          | Lactobacillus kefiranofaciens subsp. kefirgranum JCM 8572              | 28.1      | [24.7 - 31.7]  | 23.2      | [20.9 - 25.7]  | 25.9      | [23.1 - 29.0]  | 0.44            |
| 'LcCIP104459.fna'     | Lactobacillus acidophilus DSM 16047                                    | 32.0      | [28.7 - 35.6]  | 23.2      | [20.9 - 25.6]  | 28.8      | [25.9 - 31.9]  | 2.21            |
| 'LcAB70.fna'          | Lactobacillus ultunensis DSM 16047                                     | 28.3      | [25.0 - 31.9]  | 23.2      | [20.9 - 25.7]  | 26.1      | [23.2 - 29.2]  | 1.34            |
| 'LcJVV01.fna'         | Lactobacillus ultunensis DSM 16047                                     | 28.5      | [25.1 - 32.1]  | 23.2      | [20.9 - 25.7]  | 26.2      | [23.4 - 29.4]  | 0.97            |
| 'LcRL10.fasta'        | Lactobacillus kefiranofaciens subsp. kefirgranum JCM 8572              | 27.6      | [24.3 - 31.2]  | 23.2      | [20.9 - 25.7]  | 25.6      | [22.7 - 28.7]  | 0.33            |
| 'LcRL03.fasta'        | Lactobacillus acidophilus DSM 16047                                    | 26.9      | [23.5 - 30.5]  | 23.2      | [20.9 - 25.7]  | 25.0      | [22.2 - 28.1]  | 2.34            |
| Query            | Subject                                      | $d_0$ | C.I. $d_0$   | $d_4$ | C.I. $d_4$   | $d_5$ | C.I. $d_5$   | Diff. G+C Percent |
|------------------|----------------------------------------------|-------|--------------|-------|--------------|-------|--------------|-------------------|
| 'LcRL09.fna'     | Lactobacillus kefiranofaciens subsp. kefirgranum JCM 8572 | 28.4  | [25.0 - 32.0] | 23.2  | [20.9 - 25.7] | 26.1  | [23.2 - 29.2] | 0.49              |
| 'LcRL08.fna'     | Lactobacillus ultunensis DSM 16047           | 28.5  | [25.2 - 32.2] | 23.2  | [20.9 - 25.7] | 26.3  | [23.4 - 29.4] | 1.18              |
| 'LcRL09.fna'     | Lactobacillus acidophilus NBRC 13951         | 29.5  | [26.1 - 33.1] | 23.2  | [20.9 - 25.7] | 27.0  | [24.1 - 30.1] | 2.33              |
| 'LcCTV05.fna'    | Lactobacillus ultunensis DSM 16047           | 25.1  | [21.7 - 28.7] | 23.2  | [20.9 - 25.7] | 23.6  | [20.8 - 26.7] | 1.14              |
| 'Lc1252CHN.fna'  | Lactobacillus ultunensis DSM 16047           | 29.1  | [25.7 - 32.7] | 23.1  | [20.8 - 25.6] | 26.6  | [23.8 - 29.8] | 0.76              |
| 'LcMV3AUS.fna'   | Lactobacillus kefiranofaciens ATCC 43761     | 26.3  | [23.0 - 30.0] | 23.1  | [20.8 - 25.5] | 24.6  | [21.7 - 27.7] | 0.48              |
| 'LcMV1AUS.fna'   | Lactobacillus kefiranofaciens ATCC 43761     | 26.6  | [23.2 - 30.2] | 23.1  | [20.8 - 25.6] | 24.8  | [21.9 - 27.9] | 0.34              |
| 'LcJVV01.fna'    | Lactobacillus kefiranofaciens subsp. kefirgranum JCM 8572 | 27.6  | [24.3 - 31.2] | 23.1  | [20.8 - 25.6] | 25.6  | [22.7 - 28.7] | 0.52              |
| 'LcMV1AUS.fna'   | Lactobacillus kefiranofaciens subsp. kefirgranum JCM 8572 | 27.1  | [23.8 - 30.8] | 23.1  | [20.8 - 25.6] | 25.2  | [22.3 - 28.3] | 0.54              |
| 'LcMV1AUS.fna'   | Lactobacillus ultunensis DSM 16047           | 28.0  | [24.7 - 31.7] | 23.1  | [20.8 - 25.5] | 25.9  | [23.0 - 29.0] | 0.95              |
| 'LcJVV01.fna'    | Lactobacillus kefiranofaciens ATCC 43761     | 27.2  | [23.9 - 30.9] | 23.1  | [20.8 - 25.6] | 25.3  | [22.4 - 28.4] | 0.32              |
| 'Lc1252CHN.fna'  | Lactobacillus acidophilus NBRC 13951         | 29.8  | [26.4 - 33.4] | 23.1  | [20.8 - 25.6] | 27.2  | [24.3 - 30.3] | 2.09              |
| 'LcMV3AUS.fna'   | Lactobacillus ultunensis DSM 16047           | 27.7  | [24.4 - 31.3] | 23.0  | [20.7 - 25.5] | 25.6  | [22.7 - 28.7] | 0.8               |
| 'LcMV3AUS.fna'   | Lactobacillus kefiranofaciens subsp. kefirgranum JCM 8572 | 26.9  | [23.6 - 30.6] | 23.0  | [20.7 - 25.4] | 25.0  | [22.1 - 28.1] | 0.69              |
| 'Lc1252CHN.fna'  | Lactobacillus kefiranofaciens subsp. kefirgranum JCM 8572 | 27.6  | [24.3 - 31.3] | 23.0  | [20.7 - 25.4] | 25.6  | [22.7 - 28.7] | 0.73              |
| 'Lc1252CHN.fna'  | Lactobacillus kefiranofaciens ATCC 43761     | 27.3  | [23.9 - 30.9] | 23.0  | [20.7 - 25.4] | 25.3  | [22.4 - 28.4] | 0.53              |
| 'LcCTV05.fna'    | Lactobacillus acidophilus NBRC 13951         | 24.6  | [21.3 - 28.3] | 22.9  | [20.7 - 25.4] | 23.2  | [20.4 - 26.3] | 2.48              |
| 'LcCIP104459.fna'| Lactobacillus kefiranofaciens ATCC 43761     | 30.3  | [27.0 - 33.9] | 22.9  | [20.6 - 25.3] | 27.5  | [24.6 - 30.6] | 0.41              |
| 'LcCIP104459.fna'| Lactobacillus kefiranofaciens subsp. kefirgranum JCM 8572 | 31.1  | [27.8 - 34.7] | 22.8  | [20.5 - 25.3] | 28.1  | [25.2 - 31.2] | 0.62              |
| Strain                     | Authority            | Other deposits                                      | Synonyms                                                                 | Base pairs | Percent G+C | No. proteins | Goldstamp   | Bioproject accession | Biosample accession | Assembly accession | IMG OID          |
|---------------------------|----------------------|-----------------------------------------------------|--------------------------------------------------------------------------|------------|-------------|--------------|-------------|----------------------|---------------------|-------------------|------------------|
| Lactobacillus suntoryeus LMG 22464 | Cachat and Priest 2005 | NCIMB 14005; SA                                      | Lactobacillus suntoryeus                                                 | 1760 061   | 36.5        | 1825         | Gp0131240   | PRJNA224116          | SAMN02797793       | GCF_001437535     |                  |
| Lactobacillus kefiranofaciens ATCC 43761 | Fujisawa et al. 1988 emend. Vancanneyt et al. 2004 | LMG 19149; CCUG 32248; DSM 3016; JCM 6985; CIP 103307; strain WT-2B | Lactobacillus kefiranofaciens; Lactobacillus kefiranofaciens subsp. kefiranofaciens | 2281 817   | 37.2        | 2367         | Gp0099413   | PRJNA257853          | SAMN02983011       | GCA_900103655     | 2597490363       |
| Lactobacillus helveticus DSM 20075 | (Orla-Jensen 1919) Bergey et al. 1925 | LMG 13555; LMG 6413; NRRL B-4526; CCUG 30139; ATCC 15009; JCM 1120; IFO 15019; NBRC 15019; CIP 103146 | Lactobacillus helveticus, Thermobacterium helveticum | 1804 595   | 36.8        | 2078         | Gp0003635   | PRJNA34619           | SAMN00139430       | GCA_000160855     | 645951865        |
| Lactobacillus ultunensis DSM 16047 | Roos et al. 2005     | LMG 22117; CCUG 48460; JCM 16177; Kx146C1            | Lactobacillus ultunensis                                                 | 2159 701   | 35.9        | 2210         | Gp0003665   | PRJNA31505           | SAMN0001484        | GCA_000159415     | 643886047        |
| Strain               | Authority                      | Other deposits                                                                 | Synonyms                                                                      | Base pairs | Percent G+C | No. proteins | Goldstamp     | Bioproject accession | Biosample accession | Assembly accession | IMG OID        |
|----------------------|--------------------------------|--------------------------------------------------------------------------------|-------------------------------------------------------------------------------|------------|-------------|--------------|---------------|----------------------|---------------------|-------------------|-----------------|
| Lactobacillus acidophilus NBRC 13951 | (Moro 1900) Hansen and Macquot 1970 | LMG 13550; LMG 9433; BCR 10695; NRRL B-4495; CCUG 5917; DSM 20079; ATCC 4356; NCTC 12980; JCM 1132; IFO 13951; VKM B-1660; CIP 76.13 | Bacillus acidophilus; Lactobacillus acidophilus | 1955       | 34.6        | 1873         | Gp0075770     | PRJDB1353           | SAMD00046914       | GCA_001591845    |
| Lactobacillus kitasatonis JCM 1039 | Mukai et al. 2003                         | KCTC 3155; DSM 16761                                                        | Lactobacillus kitasatonis                                                   | 1902       | 37.5        | 2050         | Gp0026726     | PRJDB640            | SAMD0016339       | GCA_000615285    | 2565956592      |
| Lactobacillus gallinarum JCM 2011 | Fujisawa et al. 1992                             | LMG 9435; CCUG 30724; DSM 10532; ATCC 33199; CIP 103611; VPI 1294       | Lactobacillus gallinarum                                                    | 1918       | 36.5        | 2076         | Gp0091989     | PRJDB621            | SAMD00003603       | GCA_000614735    |
| Lactobacillus kefiranofaciens subsp. kefirgranum JCM 8572 | (Takizawa et al. 1994) Vancanneyt et al. 2004 | LMG 15132; CCUG 39467; CCUG 49353; DSM 10550; ATCC 51647; CIP 104241; GCL 1701 | Lactobacillus kefiranofaciens subsp. kefirgranum; Lactobacillus kefirgranum | 2065       | 37.4        | 2918         | Gp0093297     | PRJDB772            | SAMD00000473       | GCA_001311335    |
| Lactobacillus crispatus JCM 1185 | (Brygoo and Aladame 1953) Moore and Holdeman 1970 | LMG 9479; CCUG 30722; DSM 20584; ATCC 33820; CIP 102990; CIPPP II; VPI 3199 | Eubacterium crispatum; Lactobacillus crispatus                               | 2033       | 36.6        | 3305         | Gp0093095     | PRJDB800            | SAMD00000420       | GCA_001311685    |
| Strain                  | Authority                      | Other deposits                           | Synonyms                  | Base pairs | Percent G+C | No. proteins | Goldstamp | Bioproject accession | Biosample accession | Assembly accession | IMG OID        |
|------------------------|--------------------------------|------------------------------------------|---------------------------|------------|-------------|--------------|------------|----------------------|-------------------|-------------------|---------------|
| *Lactobacillus amyllovorus* DSM 20531 | Nakamura 1981                | LMG 9496; NRRL B-4540; CCUG 27201; ATCC 33620; JCM 1126; CIP 102989; NCAIM B.01458 | *Lactobacillus amyllovorus* | 2016       | 37.8        | 2045         | Gp0130192 | PRJNA224116          | SAMN02369422      | GCF_001433985    |               |
| *Lactobacillus sobrius* DSM 16698    | Konstantinov et al. 2006     | 1; NCCB 100067; OTU171-001               | *Lactobacillus sobrius*   | 1992       | 37.8        | 1950         | Gp0131222 | PRJNA224116          | SAMN02797775      | GCF_001437365    |               |
| Lc1252CHN.fna           |                                |                                          |                           | 2305       | 36.7        | 2221         |            |                      |                   |                  |               |
| Lc2029.fna              |                                |                                          |                           | 2397       | 36.8        | 3004         |            |                      |                   |                  |               |
| LcAB70.fna              |                                |                                          |                           | 2367       | 37.3        | 2391         |            |                      |                   |                  |               |
| LcCIP104459.fna         |                                |                                          |                           | 1993       | 36.8        | 2038         |            |                      |                   |                  |               |
| LcCRI4.fasta            |                                |                                          |                           | 2376       | 37.0        | 2465         |            |                      |                   |                  |               |
| LcCRI8.fasta            |                                |                                          |                           | 2330       | 37.0        | 2389         |            |                      |                   |                  |               |
| LcCRI10.fasta           |                                |                                          |                           | 2418       | 37.0        | 2532         |            |                      |                   |                  |               |
| LcCRI17.fasta           |                                |                                          |                           | 2384       | 36.9        | 2461         |            |                      |                   |                  |               |
| LcCTV05.fna             |                                |                                          |                           | 2364       | 37.1        | 2425         |            |                      |                   |                  |               |
| LcJVV01.fna             |                                |                                          |                           | 2221       | 36.9        | 2216         |            |                      |                   |                  |               |
| LcMV1AUS.fna            |                                |                                          |                           | 2311       | 36.9        | 2339         |            |                      |                   |                  |               |
| LcMV3AUS.fna            |                                |                                          |                           | 2437       | 36.7        | 2514         |            |                      |                   |                  |               |
| Strain   | Authority | Other deposits | Synonyms | Base pairs | Percent G+C | No. proteins | Goldstamp | Bioproject accession | Biosample accession | Assembly accession | IMG OID |
|----------|-----------|----------------|----------|------------|-------------|--------------|------------|---------------------|-------------------|-------------------|---------|
| LcRL02.fna |           |                |          | 2243/143   | 37.0        | 2447         |            |                     |                   |                   |         |
| LcRL03.fna |           |                |          | 2550/531   | 36.9        | 2886         |            |                     |                   |                   |         |
| LcRL05.fna |           |                |          | 2577/199   | 36.5        | 2857         |            |                     |                   |                   |         |
| LcRL06.fna |           |                |          | 2190/141   | 37.0        | 2483         |            |                     |                   |                   |         |
| LcRL07.fna |           |                |          | 2183/841   | 37.0        | 2454         |            |                     |                   |                   |         |
| LcRL08.fna |           |                |          | 2301/145   | 37.1        | 2622         |            |                     |                   |                   |         |
| LcRL09.fna |           |                |          | 2276/697   | 36.9        | 2526         |            |                     |                   |                   |         |
| LcRL10.fna |           |                |          | 2315/512   | 37.1        | 2579         |            |                     |                   |                   |         |
The genome sequence data were uploaded to the Type (Strain) Genome Server (TYGS), a free bioinformatics platform available at https://tygs.dsmz.de, for a whole genome-based taxonomic analysis [1]. The results were provided by the TYGS on 2020-05-25. In brief, the TYGS analysis was subdivided into the following steps:

### Determination of closely related type strains

Determination of closest type strain genomes was done in two complementary ways: First, all user genomes were compared against all type strain genomes available in the TYGS database via the MASH algorithm, a fast approximation of intergenomic relatedness [2], and, the ten type strains with the smallest MASH distances chosen per user genome. Second, an additional set of ten closely related type strains was determined via the 16S rDNA gene sequences. These were extracted from the user genomes using RnAmmer [3] and each sequence was subsequently BLASTed [4] against the 16S rDNA gene sequence of each of the currently 11767 type strains available in the TYGS database. This was used as a proxy to find the best 50 matching type strains (according to the bitscore) for each user genome and to subsequently calculate precise distances using the Genome BLAST Distance Phylogeny approach (GBDP) under the algorithm 'coverage' and distance formula $d_5$ [5]. These distances were finally used to determine the 10 closest type strain genomes for each of the user genomes.

### Pairwise comparison of genome sequences

All pairwise comparisons among the set of genomes were conducted using GBDP and accurate intergenomic distances inferred under the algorithm 'trimming' and distance formula $d_5$ [5]. 100 distance replicates were calculated each. Digital DDH values and confidence intervals were calculated using the recommended settings of the GGDC 2.1 [5].

### Phylogenetic inference

The resulting intergenomic distances were used to infer a balanced minimum evolution tree with branch support via FASTME 2.1.4 including SPR postprocessing [6]. Branch support was inferred from 100 pseudo-bootstrap replicates each. The trees were rooted at the midpoint [7] and visualized with PhyD3 [8].

### Type-based species and subspecies clustering

The type-based species clustering using a 70% dDDH radius around each of the 11 type strains was done as previously described [1]. The resulting groups are shown in Table 1 and 4. Subspecies clustering was done using a 79% dDDH threshold as previously introduced [9].

### Results

#### Type-based species and subspecies clustering

The resulting species and subspecies clusters are listed in Table 4, whereas the taxonomic identification of the query strains is found in Table 1. Briefly, the clustering yielded 8 species clusters and the provided query strains were assigned to 1 of these. Moreover, user strains were located in 2 of 10 subspecies clusters.

**Figure caption genome tree**

**Figure 1.** Tree inferred with FastME 2.1.6.1 [6] from GBDP distances calculated from genome sequences. The branch lengths are scaled in terms of GBDP distance formula $d_5$. The numbers above branches are GBDP pseudo-bootstrap support values > 60 % from 100 replications, with an average branch support of 56.8 %. The tree was rooted at the midpoint [7].

**Figure caption SSU tree**

**Figure 2.** Tree inferred with FastME 2.1.6.1 [6] from GBDP distances calculated from 16S rDNA gene sequences. The branch lengths are scaled in terms of GBDP distance formula $d_5$. The numbers above branches are GBDP pseudo-bootstrap support values > 60 % from 100 replications, with an average branch support of 51.0 %. The tree was rooted at the midpoint [7].
References

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Table 1: Phylogenies

Publication-ready versions of both the genome-scale GBDP tree and the 16S rRNA gene sequence tree can be customized and exported either in SVG (vector graphic) or PNG format from within the phylogeny viewers in your TYGS result page. For publications the **SVG format is recommended** because it is lossless, always keeps its high resolution and can also be easily converted to other popular formats such as PDF or EPS. Please follow the link provided above!

Table 2: Identification

The below list contains the result of the TYGS species identification routine.

Explanation of remarks that might occur in the below table:

remark **[R1]**: The TYGS type strain database is automatically updated on an almost daily basis. However, if a particular type strain genome is not available in the TYGS database, this can have several reasons which are detailed in the FAQ. You can request an extended 16S rRNA gene analysis via the 16S tree viewer found in your result page to detect **not yet genome-sequenced** type strains relevant for your study.

remark **[R2]**: >70% dDDH value (formula \(d_4\)) and (almost) minimal dDDH values for gene-content formulae \(d_0\) and \(d_6\) indicate a potentially unreliable identification result and should thus be checked via the 16S rRNA gene sequence similarity. Such strong deviations can, in principle, be caused by sequence contamination.

remark **[R3]**: G+C content difference of >1% indicates a potentially unreliable identification result because within species G+C content varies no more than 1%, if computed from genome sequences (PMID: 24505073).

| Strain   | Conclusion               | Identification result | Remark          |
|----------|--------------------------|-----------------------|-----------------|
| 'LcRL11' | belongs to known species | **Lactobacillus crispatus** |                |
| 'LcRL13' | belongs to known species | **Lactobacillus crispatus** |                |
| 'LcRL14' | belongs to known species | **Lactobacillus crispatus** |                |
| 'LcRL15' | belongs to known species | **Lactobacillus crispatus** |                |
| 'LcRL16' | belongs to known species | **Lactobacillus crispatus** |                |
| 'LcRL17' | belongs to known species | **Lactobacillus crispatus** | see [R3]       |
| 'LcRL19' | belongs to known species | **Lactobacillus crispatus** | see [R3]       |
| 'LcRL20' | belongs to known species | **Lactobacillus crispatus** |                |
| 'LcRL21' | belongs to known species | **Lactobacillus crispatus** |                |
| 'LcRL23' | belongs to known species | **Lactobacillus crispatus** |                |
| 'LcRL24' | belongs to known species | **Lactobacillus crispatus** |                |
| 'LcRL25' | belongs to known species | **Lactobacillus crispatus** |                |
| 'LcRL26' | belongs to known species | **Lactobacillus crispatus** |                |
| 'LcRL27' | belongs to known species | **Lactobacillus crispatus** |                |
| 'LcRL28' | belongs to known species | **Lactobacillus crispatus** |                |
| Strain   | Conclusion                     | Identification result            | Remark |
|----------|--------------------------------|----------------------------------|--------|
| 'LcRL29' | belongs to known species       | *Lactobacillus crispatus*        |        |
| 'LcRL30' | belongs to known species       | *Lactobacillus crispatus*        |        |
| 'LcRL31' | belongs to known species       | *Lactobacillus crispatus*        |        |
| 'LcRL32' | belongs to known species       | *Lactobacillus crispatus*        |        |
| 'LcRL33' | belongs to known species       | *Lactobacillus crispatus*        |        |
### Table 3: Pairwise comparisons of user genomes vs. type-strain genomes

The following table contains the pairwise dDDH values between your user genomes and the selected type-strain genomes. The dDDH values are provided along with their confidence intervals (C.I.) for the three different GBDP formulas:

- **formula** $d_0$ (a.k.a. GGDC formula 1): length of all HSPs divided by total genome length
- **formula** $d_4$ (a.k.a. GGDC formula 2): sum of all identities found in HSPs divided by overall HSP length
- **formula** $d_6$ (a.k.a. GGDC formula 3): sum of all identities found in HSPs divided by total genome length

**Note:** Formula $d_4$ is independent of genome length and is thus robust against the use of incomplete draft genomes. For other reasons for preferring formula $d_4$, see the FAQ.

| Query       | Subject     | $d_0$ | C.I. $d_0$   | $d_4$ | C.I. $d_4$ | $d_6$ | C.I. $d_6$ | Diff. G+C Percent |
|-------------|-------------|-------|--------------|-------|------------|-------|------------|------------------|
| 'LcRL21.fna' | 'LcRL27.fna' | 98.9  | [98.1 - 99.4] | 99.9  | [99.7 - 99.9] | 99.5  | [99.2 - 99.7] | 0.08              |
| 'LcRL24.fna' | 'LcRL26.fna' | 95.0  | [92.6 - 96.6] | 99.9  | [99.8 - 100.0] | 97.3  | [96.0 - 98.2] | 0.68              |
| 'LcRL19.fna' | 'LcRL33.fna' | 92.3  | [89.4 - 94.4] | 99.9  | [99.7 - 99.9] | 95.6  | [93.8 - 96.9] | 0.75              |
| 'LcRL19.fna' | 'LcRL24.fna' | 94.4  | [92.0 - 96.2] | 99.9  | [99.8 - 99.9] | 97.0  | [95.5 - 97.9] | 0.92              |
| 'LcRL24.fna' | 'LcRL33.fna' | 99.1  | [98.3 - 99.5] | 99.9  | [99.8 - 99.9] | 99.6  | [99.3 - 99.8] | 0.17              |
| 'LcRL13.fna' | 'LcRL28.fna' | 99.4  | [98.9 - 99.7] | 99.9  | [99.8 - 99.9] | 99.8  | [99.5 - 99.9] | 0.14              |
| 'LcRL31.fna' | 'LcRL32.fna' | 99.1  | [98.4 - 99.5] | 99.9  | [99.9 - 100.0] | 99.6  | [99.3 - 99.8] | 0.04              |
| 'LcRL19.fna' | 'LcRL26.fna' | 98.1  | [96.9 - 98.9] | 99.9  | [99.8 - 100.0] | 99.1  | [98.5 - 99.5] | 0.24              |
| 'LcRL26.fna' | 'LcRL33.fna' | 92.8  | [90.0 - 94.8] | 99.9  | [99.8 - 99.9] | 95.9  | [94.2 - 97.1] | 0.51              |
| 'LcRL15.fna' | 'LcRL30.fna' | 99.4  | [98.8 - 99.7] | 99.8  | [99.6 - 99.9] | 99.7  | [99.5 - 99.9] | 0.25              |
| 'LcRL26.fna' | 'LcRL29.fna' | 98.4  | [97.2 - 99.1] | 99.8  | [99.7 - 99.9] | 99.2  | [98.7 - 99.9] | 0.28              |
| 'LcRL19.fna' | 'LcRL29.fna' | 98.0  | [96.7 - 98.8] | 99.8  | [99.7 - 99.9] | 99.0  | [98.4 - 99.4] | 0.52              |
| 'LcRL29.fna' | 'LcRL33.fna' | 93.0  | [90.3 - 95.1] | 99.8  | [99.7 - 99.9] | 96.1  | [94.4 - 97.3] | 0.23              |
| 'LcRL24.fna' | 'LcRL29.fna' | 94.7  | [92.3 - 96.4] | 99.8  | [99.7 - 99.9] | 97.1  | [95.7 - 98.1] | 0.4               |
| 'LcRL23.fna' | 'LcRL25.fna' | 99.9  | [99.8 - 100.0] | 99.7  | [99.6 - 99.9] | 100.0 | [99.9 - 100.0] | 0.07              |
| 'LcRL15.fna' | 'LcRL17.fna' | 96.6  | [94.7 - 97.8] | 99.6  | [99.3 - 99.8] | 98.2  | [97.2 - 98.9] | 1.18              |
| 'LcRL11.fna' | 'LcRL25.fna' | 95.8  | [93.8 - 97.2] | 99.4  | [99.0 - 99.6] | 97.7  | [96.6 - 98.5] | 0.02              |
| 'LcRL11.fna' | 'LcRL33.fna' | 90.4  | [87.2 - 92.9] | 99.4  | [99.0 - 99.6] | 94.2  | [92.1 - 95.8] | 0.03              |
| 'LcRL23.fna' | 'LcRL28.fna' | 94.9  | [92.5 - 96.5] | 99.4  | [99.0 - 99.6] | 97.1  | [95.8 - 98.1] | 0.43              |
| 'LcRL13.fna' | 'LcRL33.fna' | 89.9  | [86.7 - 92.5] | 99.4  | [99.0 - 99.6] | 93.9  | [91.7 - 95.5] | 0.22              |
| 'LcRL25.fna' | 'LcRL28.fna' | 94.7  | [92.3 - 96.4] | 99.4  | [99.1 - 99.7] | 97.0  | [95.6 - 98.0] | 0.36              |
| 'LcRL28.fna' | 'LcRL33.fna' | 89.4  | [86.0 - 92.0] | 99.4  | [99.0 - 99.6] | 93.5  | [91.2 - 95.2] | 0.36              |
| Query     | Subject     | $d_0$  | C.I. $d_0$ | $d_4$  | C.I. $d_4$ | $d_5$  | C.I. $d_5$ | Diff. G+C Percent |
|-----------|-------------|--------|------------|--------|------------|--------|------------|-------------------|
| 'LcRL17.fna' | 'LcRL30.fna' | 97.4   | [95.8 - 98.4] | 99.4   | [99.1 - 99.6] | 98.7   | [97.9 - 99.2] | 1.43              |
| 'LcRL11.fna' | 'LcRL23.fna' | 96.0   | [94.0 - 97.4] | 99.4   | [99.0 - 99.6] | 97.8   | [96.7 - 98.6] | 0.09              |
| 'LcRL13.fna' | 'LcRL25.fna' | 95.1   | [92.9 - 96.7] | 99.3   | [98.9 - 99.6] | 97.3   | [96.0 - 98.2] | 0.22              |
| 'LcRL19.fna' | 'LcRL28.fna' | 92.8   | [90.0 - 94.9] | 99.3   | [98.9 - 99.5] | 95.8   | [94.1 - 97.1] | 0.38              |
| 'LcRL26.fna' | 'LcRL28.fna' | 93.4   | [90.7 - 95.3] | 99.3   | [98.8 - 99.5] | 96.2   | [94.5 - 97.3] | 0.15              |
| 'LcRL13.fna' | 'LcRL19.fna' | 93.4   | [90.7 - 95.3] | 99.3   | [98.8 - 99.5] | 96.2   | [94.5 - 97.3] | 0.53              |
| 'LcRL11.fna' | 'LcRL19.fna' | 93.8   | [91.3 - 95.7] | 99.3   | [98.8 - 99.5] | 96.5   | [94.9 - 97.6] | 0.72              |
| 'LcRL11.fna' | 'LcRL29.fna' | 94.1   | [91.6 - 95.9] | 99.2   | [98.7 - 99.5] | 96.6   | [95.1 - 97.7] | 0.21              |
| 'LcRL20.fna' | 'LcRL28.fna' | 86.8   | [83.2 - 89.7] | 99.2   | [98.8 - 99.5] | 91.6   | [89.0 - 93.6] | 0.74              |
| 'LcRL28.fna' | 'LcRL30.fna' | 96.3   | [94.4 - 97.6] | 99.2   | [98.8 - 99.5] | 98.0   | [97.0 - 98.7] | 0.33              |
| 'LcRL13.fna' | 'LcRL24.fna' | 89.0   | [85.7 - 91.7] | 99.2   | [98.7 - 99.5] | 93.2   | [90.9 - 94.9] | 0.39              |
| 'LcRL11.fna' | 'LcRL26.fna' | 94.4   | [92.0 - 96.2] | 99.2   | [98.8 - 99.5] | 96.9   | [95.4 - 97.9] | 0.48              |
| 'LcRL13.fna' | 'LcRL29.fna' | 93.6   | [91.0 - 95.5] | 99.2   | [98.7 - 99.5] | 96.3   | [94.7 - 97.5] | 0.01              |
| 'LcRL13.fna' | 'LcRL23.fna' | 95.3   | [93.1 - 96.9] | 99.2   | [98.8 - 99.5] | 97.4   | [96.2 - 98.3] | 0.29              |
| 'LcRL28.fna' | 'LcRL29.fna' | 93.1   | [90.4 - 95.1] | 99.2   | [98.7 - 99.5] | 96.0   | [94.3 - 97.2] | 0.13              |
| 'LcRL11.fna' | 'LcRL24.fna' | 89.7   | [86.5 - 92.3] | 99.2   | [98.7 - 99.5] | 93.7   | [91.5 - 95.3] | 0.2               |
| 'LcRL13.fna' | 'LcRL26.fna' | 93.9   | [91.3 - 95.7] | 99.2   | [98.7 - 99.5] | 96.5   | [94.9 - 97.6] | 0.29              |
| 'LcRL17.fna' | 'LcRL28.fna' | 92.6   | [89.7 - 94.7] | 99.2   | [98.8 - 99.5] | 95.6   | [93.9 - 96.9] | 1.1               |
| 'LcRL24.fna' | 'LcRL28.fna' | 88.5   | [85.1 - 91.2] | 99.2   | [98.8 - 99.5] | 92.8   | [90.4 - 94.6] | 0.53              |
| 'LcRL15.fna' | 'LcRL28.fna' | 94.8   | [92.5 - 96.5] | 99.2   | [98.8 - 99.5] | 97.1   | [95.7 - 98.1] | 0.08              |
| 'LcRL11.fna' | 'LcRL17.fna' | 93.5   | [90.8 - 95.4] | 99.2   | [98.7 - 99.5] | 96.3   | [94.6 - 97.4] | 1.44              |
| 'LcRL11.fna' | 'LcRL20.fna' | 88.0   | [84.6 - 90.8] | 99.2   | [98.7 - 99.5] | 92.5   | [90.0 - 94.3] | 0.4               |
| 'LcRL13.fna' | 'LcRL20.fna' | 87.5   | [84.0 - 90.3] | 99.2   | [98.7 - 99.5] | 92.0   | [89.6 - 94.0] | 0.6               |
| 'LcRL11.fna' | 'LcRL30.fna' | 97.1   | [95.4 - 98.2] | 99.2   | [98.8 - 99.5] | 98.5   | [97.6 - 99.0] | 0.01              |
| 'LcRL11.fna' | 'LcRL15.fna' | 95.9   | [93.8 - 97.3] | 99.2   | [98.7 - 99.5] | 97.8   | [96.6 - 98.5] | 0.26              |
| 'LcRL11.fna' | 'LcRL31.fna' | 92.1   | [89.2 - 94.3] | 99.1   | [98.5 - 99.4] | 95.3   | [93.5 - 96.7] | 0.3               |
| 'LcRL13.fna' | 'LcRL17.fna' | 93.1   | [90.4 - 95.1] | 99.1   | [98.6 - 99.4] | 96.0   | [94.3 - 97.2] | 1.24              |
| Query       | Subject       | $d_0$  | C.I. $d_0$  | $d_4$  | C.I. $d_4$  | $d_5$  | C.I. $d_5$  | Diff. G+C Percent |
|------------|---------------|--------|-------------|--------|-------------|--------|-------------|-------------------|
| 'LcRL20.fna' | 'LcRL25.fna'  | 81.3   | [77.4 - 84.7] | 99.1   | [98.6 - 99.4] | 87.2   | [84.2 - 90.7] | 0.38              |
| 'LcRL28.fna' | 'LcRL31.fna'  | 91.2   | [88.2 - 93.6] | 99.1   | [98.6 - 99.4] | 94.7   | [92.7 - 96.2] | 0.04              |
| 'LcRL13.fna' | 'LcRL15.fna'  | 95.3   | [93.1 - 96.8] | 99.1   | [98.6 - 99.4] | 97.4   | [96.1 - 98.3] | 0.06              |
| 'LcRL28.fna' | 'LcRL32.fna'  | 90.4   | [87.2 - 92.9] | 99.1   | [98.5 - 99.4] | 94.1   | [92.0 - 95.7] | 0.0               |
| 'LcRL20.fna' | 'LcRL23.fna'  | 81.6   | [77.7 - 84.9] | 99.1   | [98.6 - 99.4] | 87.4   | [84.4 - 89.9] | 0.31              |
| 'LcRL13.fna' | 'LcRL30.fna'  | 96.8   | [95.0 - 97.9] | 99.1   | [98.7 - 99.4] | 98.3   | [97.3 - 98.9] | 0.18              |
| 'LcRL23.fna' | 'LcRL26.fna'  | 88.9   | [85.5 - 91.6] | 99.0   | [98.5 - 99.4] | 93.1   | [90.7 - 94.8] | 0.58              |
| 'LcRL11.fna' | 'LcRL32.fna'  | 91.3   | [88.3 - 93.7] | 99.0   | [98.5 - 99.4] | 94.8   | [92.8 - 96.2] | 0.34              |
| 'LcRL13.fna' | 'LcRL32.fna'  | 90.9   | [87.8 - 93.3] | 99.0   | [98.5 - 99.3] | 94.5   | [92.4 - 96.0] | 0.14              |
| 'LcRL19.fna' | 'LcRL25.fna'  | 88.1   | [84.6 - 90.9] | 99.0   | [98.5 - 99.4] | 92.5   | [90.1 - 94.3] | 0.74              |
| 'LcRL13.fna' | 'LcRL31.fna'  | 91.8   | [88.8 - 94.0] | 99.0   | [98.5 - 99.4] | 95.1   | [93.1 - 96.5] | 0.1               |
| 'LcRL25.fna' | 'LcRL26.fna'  | 88.7   | [85.3 - 91.4] | 99.0   | [98.4 - 99.3] | 92.9   | [90.6 - 94.7] | 0.51              |
| 'LcRL19.fna' | 'LcRL23.fna'  | 88.3   | [84.8 - 91.0] | 99.0   | [98.5 - 99.4] | 92.6   | [90.2 - 94.4] | 0.81              |
| 'LcRL23.fna' | 'LcRL29.fna'  | 88.6   | [85.1 - 91.3] | 98.9   | [98.4 - 99.3] | 92.8   | [90.4 - 94.6] | 0.3               |
| 'LcRL25.fna' | 'LcRL29.fna'  | 88.3   | [84.9 - 91.1] | 98.9   | [98.4 - 99.3] | 92.6   | [90.2 - 94.5] | 0.23              |
| 'LcRL11.fna' | 'LcRL28.fna'  | 99.6   | [99.2 - 99.8] | 98.8   | [98.3 - 99.2] | 99.8   | [99.6 - 99.9] | 0.34              |
| 'LcRL25.fna' | 'LcRL32.fna'  | 84.8   | [81.1 - 88.0] | 98.7   | [98.1 - 99.1] | 89.9   | [87.2 - 92.2] | 0.36              |
| 'LcRL23.fna' | 'LcRL33.fna'  | 84.8   | [81.0 - 87.9] | 98.7   | [98.1 - 99.2] | 89.9   | [87.1 - 92.1] | 0.07              |
| 'LcRL17.fna' | 'LcRL25.fna'  | 88.2   | [84.8 - 91.0] | 98.7   | [98.0 - 99.1] | 92.5   | [90.1 - 94.4] | 1.46              |
| 'LcRL17.fna' | 'LcRL33.fna'  | 86.2   | [82.6 - 89.2] | 98.7   | [98.0 - 99.1] | 91.0   | [88.4 - 93.1] | 1.46              |
| 'LcRL25.fna' | 'LcRL30.fna'  | 92.3   | [89.4 - 94.5] | 98.7   | [98.1 - 99.1] | 95.4   | [93.6 - 96.7] | 0.03              |
| 'LcRL23.fna' | 'LcRL31.fna'  | 85.5   | [81.8 - 88.0] | 98.7   | [98.1 - 99.2] | 90.5   | [87.8 - 92.0] | 0.39              |
| 'LcRL15.fna' | 'LcRL25.fna'  | 91.0   | [87.9 - 93.4] | 98.7   | [98.1 - 99.1] | 94.5   | [92.5 - 96.0] | 0.28              |
| 'LcRL25.fna' | 'LcRL33.fna'  | 84.5   | [80.8 - 87.7] | 98.7   | [98.1 - 99.2] | 89.7   | [86.9 - 92.0] | 0.01              |
| 'LcRL23.fna' | 'LcRL32.fna'  | 85.0   | [81.3 - 88.1] | 98.7   | [98.1 - 99.1] | 90.1   | [87.3 - 92.3] | 0.43              |
| 'LcRL25.fna' | 'LcRL31.fna'  | 85.4   | [81.6 - 88.4] | 98.7   | [98.1 - 99.1] | 90.3   | [87.6 - 92.5] | 0.32              |
| 'LcRL15.fna' | 'LcRL23.fna'  | 91.3   | [88.2 - 93.6] | 98.6   | [97.9 - 99.0] | 94.7   | [92.7 - 96.1] | 0.35              |
| Query       | Subject       | $d_0$ | C.I. $d_0$ | $d_4$ | C.I. $d_4$ | $d_7$ | C.I. $d_7$ | Diff. G+C Percent |
|------------|---------------|-------|------------|-------|------------|-------|------------|-------------------|
| 'LcRL17.fna' | 'LcRL23.fna'  | 88.4  | [85.0 - 91.2] | 98.6  | [97.9 - 99.0] | 92.6  | [90.2 - 94.5] | 1.53              |
| 'LcRL19.fna' | 'LcRL31.fna'  | 94.4  | [92.0 - 96.2] | 98.6  | [97.9 - 99.1] | 96.8  | [95.3 - 97.8] | 0.43              |
| 'LcRL23.fna' | 'LcRL30.fna'  | 92.5  | [89.7 - 94.6] | 98.6  | [87.9 - 99.1] | 95.5  | [93.7 - 96.8] | 0.1               |
| 'LcRL26.fna' | 'LcRL31.fna'  | 94.9  | [92.6 - 96.6] | 98.6  | [97.9 - 99.0] | 97.1  | [95.7 - 98.0] | 0.19              |
| 'LcRL19.fna' | 'LcRL32.fna'  | 94.3  | [91.8 - 96.0] | 98.6  | [97.9 - 99.0] | 96.7  | [95.2 - 97.7] | 0.38              |
| 'LcRL29.fna' | 'LcRL31.fna'  | 94.7  | [92.3 - 96.4] | 98.6  | [97.9 - 99.0] | 96.9  | [95.5 - 97.9] | 0.09              |
| 'LcRL26.fna' | 'LcRL32.fna'  | 94.7  | [92.3 - 96.3] | 98.5  | [97.8 - 99.0] | 96.9  | [95.5 - 97.9] | 0.15              |
| 'LcRL24.fna' | 'LcRL31.fna'  | 90.4  | [87.2 - 92.9] | 98.5  | [97.8 - 99.0] | 94.0  | [91.9 - 95.6] | 0.49              |
| 'LcRL24.fna' | 'LcRL32.fna'  | 90.1  | [86.8 - 92.6] | 98.5  | [97.8 - 99.0] | 93.8  | [91.6 - 95.4] | 0.53              |
| 'LcRL30.fna' | 'LcRL33.fna'  | 90.7  | [87.5 - 93.1] | 98.5  | [97.8 - 99.0] | 94.2  | [92.1 - 95.8] | 0.04              |
| 'LcRL32.fna' | 'LcRL33.fna'  | 87.9  | [84.4 - 90.7] | 98.5  | [97.7 - 99.0] | 92.2  | [89.8 - 94.1] | 0.36              |
| 'LcRL15.fna' | 'LcRL33.fna'  | 89.4  | [86.1 - 92.0] | 98.5  | [97.8 - 99.0] | 93.4  | [91.1 - 95.1] | 0.28              |
| 'LcRL31.fna' | 'LcRL33.fna'  | 88.3  | [84.8 - 91.0] | 98.5  | [97.8 - 99.0] | 92.5  | [90.1 - 94.4] | 0.32              |
| 'LcRL29.fna' | 'LcRL32.fna'  | 94.4  | [91.9 - 96.1] | 98.5  | [97.7 - 99.0] | 96.7  | [95.2 - 97.8] | 0.13              |
| 'LcRL13.fna' | 'LcRL27.fna'  | 85.6  | [82.0 - 88.7] | 98.4  | [97.6 - 98.9] | 90.5  | [87.8 - 92.7] | 0.15              |
| 'LcRL20.fna' | 'LcRL30.fna'  | 89.7  | [86.4 - 92.2] | 98.4  | [97.6 - 98.9] | 93.5  | [91.3 - 95.2] | 0.41              |
| 'LcRL19.fna' | 'LcRL20.fna'  | 87.7  | [84.2 - 90.5] | 98.4  | [97.6 - 98.9] | 92.1  | [89.6 - 94.0] | 1.12              |
| 'LcRL11.fna' | 'LcRL27.fna'  | 86.0  | [82.4 - 89.0] | 98.4  | [97.6 - 98.9] | 90.8  | [88.1 - 92.9] | 0.34              |
| 'LcRL23.fna' | 'LcRL24.fna'  | 84.9  | [81.2 - 88.0] | 98.4  | [97.6 - 98.9] | 89.9  | [87.2 - 92.2] | 0.1               |
| 'LcRL13.fna' | 'LcRL21.fna'  | 86.0  | [82.4 - 89.0] | 98.4  | [97.6 - 98.9] | 90.8  | [88.2 - 92.9] | 0.07              |
| 'LcRL27.fna' | 'LcRL28.fna'  | 85.1  | [81.4 - 88.2] | 98.4  | [97.6 - 98.9] | 90.1  | [87.4 - 92.3] | 0.0               |
| 'LcRL11.fna' | 'LcRL21.fna'  | 86.5  | [82.9 - 89.5] | 98.4  | [97.6 - 98.9] | 91.2  | [88.6 - 93.2] | 0.26              |
| 'LcRL21.fna' | 'LcRL28.fna'  | 85.5  | [81.8 - 88.6] | 98.4  | [97.7 - 98.9] | 90.4  | [87.7 - 92.6] | 0.08              |
| 'LcRL20.fna' | 'LcRL26.fna'  | 88.4  | [84.9 - 91.1] | 98.4  | [97.6 - 98.9] | 92.6  | [90.2 - 94.4] | 0.89              |
| 'LcRL20.fna' | 'LcRL29.fna'  | 88.0  | [84.5 - 90.8] | 98.3  | [97.6 - 98.9] | 92.3  | [89.9 - 94.2] | 0.61              |
| 'LcRL20.fna' | 'LcRL33.fna'  | 84.7  | [80.9 - 87.8] | 98.3  | [97.6 - 98.9] | 89.8  | [87.0 - 92.0] | 0.37              |
| 'LcRL24.fna' | 'LcRL25.fna'  | 84.5  | [80.8 - 87.7] | 98.3  | [97.6 - 98.9] | 89.6  | [86.8 - 91.9] | 0.18              |
| Query       | Subject       | $d_0$   | C.I. $d_0$ | $d_4$   | C.I. $d_4$ | $d_5$   | C.I. $d_5$ | Diff. G+C Percent |
|-------------|---------------|---------|------------|---------|------------|---------|------------|------------------|
| LcRL17.fna  | LcRL19.fna    | 92.8    | [90.0 - 94.9] | 98.3    | [97.6 - 98.9] | 95.7    | [93.9 - 97.0] | 0.71             |
| LcRL17.fna  | LcRL20.fna    | 85.2    | [81.4 - 88.2] | 98.3    | [97.6 - 98.9] | 90.1    | [87.4 - 92.3] | 1.84             |
| LcRL20.fna  | LcRL24.fna    | 83.7    | [79.9 - 86.9] | 98.3    | [97.5 - 98.8] | 89.0    | [86.1 - 91.3] | 0.2              |
| LcRL17.fna  | LcRL26.fna    | 93.1    | [90.4 - 95.1] | 98.3    | [97.5 - 98.8] | 95.9    | [94.1 - 97.1] | 0.95             |
| LcRL16.fna  | LcRL28.fna    | 82.5    | [78.6 - 85.8] | 98.2    | [97.4 - 98.8] | 88.0    | [85.0 - 90.4] | 0.69             |
| LcRL19.fna  | LcRL30.fna    | 96.5    | [94.6 - 97.7] | 98.2    | [97.3 - 98.7] | 98.0    | [96.9 - 98.7] | 0.71             |
| LcRL17.fna  | LcRL29.fna    | 92.8    | [90.0 - 94.9] | 98.2    | [97.4 - 98.8] | 95.7    | [93.9 - 96.9] | 1.23             |
| LcRL13.fna  | LcRL16.fna    | 83.2    | [79.3 - 86.4] | 98.2    | [97.4 - 98.7] | 88.5    | [85.6 - 90.9] | 0.55             |
| LcRL30.fna  | LcRL31.fna    | 94.8    | [92.4 - 96.4] | 98.2    | [97.4 - 98.8] | 97.0    | [95.5 - 97.9] | 0.28             |
| LcRL17.fna  | LcRL24.fna    | 88.4    | [85.0 - 91.2] | 98.2    | [97.4 - 98.8] | 92.6    | [90.2 - 94.4] | 1.63             |
| LcRL11.fna  | LcRL16.fna    | 83.6    | [79.8 - 86.8] | 98.2    | [97.4 - 98.8] | 88.9    | [86.0 - 91.2] | 0.35             |
| LcRL20.fna  | LcRL27.fna    | 79.3    | [75.4 - 82.8] | 98.2    | [97.4 - 98.7] | 85.4    | [82.2 - 88.1] | 0.74             |
| LcRL15.fna  | LcRL19.fna    | 95.5    | [93.3 - 97.0] | 98.2    | [97.3 - 98.7] | 97.4    | [96.1 - 98.3] | 0.47             |
| LcRL20.fna  | LcRL21.fna    | 79.6    | [75.6 - 83.0] | 98.2    | [97.4 - 98.8] | 85.6    | [82.4 - 88.2] | 0.66             |
| LcRL15.fna  | LcRL26.fna    | 96.0    | [94.0 - 97.4] | 98.1    | [97.3 - 98.7] | 97.7    | [96.5 - 98.5] | 0.23             |
| LcRL29.fna  | LcRL30.fna    | 96.7    | [94.9 - 97.9] | 98.1    | [97.2 - 98.7] | 98.1    | [97.1 - 98.8] | 0.2              |
| LcRL26.fna  | LcRL30.fna    | 96.9    | [95.2 - 98.0] | 98.1    | [97.3 - 98.7] | 98.3    | [97.3 - 98.9] | 0.47             |
| LcRL15.fna  | LcRL24.fna    | 91.7    | [88.8 - 94.0] | 98.1    | [97.2 - 98.7] | 94.9    | [93.0 - 96.3] | 0.45             |
| LcRL15.fna  | LcRL29.fna    | 95.7    | [93.6 - 97.2] | 98.1    | [97.2 - 98.7] | 97.5    | [96.3 - 98.4] | 0.05             |
| LcRL30.fna  | LcRL32.fna    | 94.5    | [92.0 - 96.2] | 98.1    | [97.3 - 98.7] | 96.7    | [95.2 - 97.8] | 0.33             |
| LcRL15.fna  | LcRL20.fna    | 88.5    | [85.1 - 91.2] | 98.1    | [97.3 - 98.7] | 92.6    | [90.2 - 94.4] | 0.66             |
| LcRL14.fna  | LcRL33.fna    | 79.8    | [75.9 - 83.3] | 98.1    | [97.2 - 98.7] | 85.8    | [82.6 - 88.4] | 0.12             |
| LcRL24.fna  | LcRL30.fna    | 92.7    | [89.9 - 94.8] | 98.1    | [97.2 - 98.7] | 95.6    | [93.8 - 96.9] | 0.21             |
| LcRL16.fna  | LcRL20.fna    | 92.3    | [89.4 - 94.5] | 98.0    | [97.1 - 98.6] | 95.3    | [93.4 - 96.6] | 0.05             |
| LcRL20.fna  | LcRL32.fna    | 88.6    | [85.2 - 91.3] | 97.8    | [96.9 - 98.5] | 92.6    | [90.2 - 94.5] | 0.74             |
| LcRL20.fna  | LcRL31.fna    | 89.0    | [85.6 - 91.6] | 97.8    | [96.9 - 98.5] | 92.9    | [90.6 - 94.7] | 0.7              |
| LcRL16.fna  | LcRL19.fna    | 86.7    | [83.1 - 89.6] | 97.8    | [96.8 - 98.4] | 91.2    | [88.6 - 93.2] | 1.08             |
| Query         | Subject       | d₀     | C.I. d₀ | d₄     | C.I. d₄ | d₅     | C.I. d₅ | Diff. G+C Percent |
|--------------|---------------|--------|---------|--------|---------|--------|---------|------------------|
| LcRL16.fna   | LcRL29.fna    | 86.6   | [83.0 - 89.6] | 97.7   | [96.7 - 98.4] | 91.1   | [88.5 - 93.2] | 0.56             |
| LcRL16.fna   | LcRL26.fna    | 87.1   | [83.5 - 89.9] | 97.7   | [96.8 - 98.4] | 91.5   | [88.9 - 93.5] | 0.84             |
| LcRL17.fna   | LcRL31.fna    | 90.6   | [87.5 - 93.1] | 97.7   | [96.7 - 98.4] | 94.1   | [92.0 - 95.7] | 1.14             |
| LcRL15.fna   | LcRL31.fna    | 93.8   | [91.2 - 95.7] | 97.7   | [96.8 - 98.4] | 96.3   | [94.6 - 97.4] | 0.04             |
| LcRL15.fna   | LcRL32.fna    | 93.4   | [90.8 - 95.4] | 97.7   | [96.7 - 98.4] | 96.0   | [94.3 - 97.2] | 0.08             |
| LcRL23.fna   | LcRL27.fna    | 81.0   | [77.0 - 84.3] | 97.6   | [96.6 - 98.3] | 86.6   | [83.5 - 89.2] | 0.43             |
| LcRL21.fna   | LcRL23.fna    | 81.4   | [77.5 - 84.7] | 97.6   | [96.6 - 98.3] | 87.0   | [83.9 - 89.5] | 0.35             |
| LcRL17.fna   | LcRL32.fna    | 90.5   | [87.3 - 92.9] | 97.6   | [96.7 - 98.3] | 94.0   | [91.8 - 95.6] | 1.1              |
| LcRL14.fna   | LcRL20.fna    | 80.5   | [76.5 - 83.9] | 97.6   | [96.6 - 98.3] | 86.2   | [83.1 - 88.8] | 0.26             |
| LcRL16.fna   | LcRL23.fna    | 88.8   | [85.4 - 91.5] | 97.5   | [96.5 - 98.3] | 92.7   | [90.4 - 94.6] | 0.26             |
| LcRL21.fna   | LcRL25.fna    | 81.3   | [77.4 - 84.6] | 97.5   | [96.5 - 98.3] | 86.9   | [83.8 - 89.4] | 0.28             |
| LcRL16.fna   | LcRL25.fna    | 88.6   | [85.1 - 91.3] | 97.5   | [96.5 - 98.3] | 92.6   | [90.2 - 94.4] | 0.33             |
| LcRL25.fna   | LcRL27.fna    | 80.8   | [76.9 - 84.2] | 97.5   | [96.5 - 98.3] | 86.5   | [83.4 - 89.1] | 0.36             |
| LcRL14.fna   | LcRL28.fna    | 84.1   | [80.3 - 87.2] | 97.4   | [96.4 - 98.2] | 89.1   | [86.2 - 91.4] | 0.48             |
| LcRL11.fna   | LcRL14.fna    | 85.1   | [81.4 - 88.2] | 97.3   | [96.3 - 98.1] | 89.9   | [87.1 - 92.1] | 0.14             |
| LcRL13.fna   | LcRL14.fna    | 84.7   | [80.9 - 87.8] | 97.3   | [96.3 - 98.1] | 89.6   | [86.8 - 91.8] | 0.34             |
| LcRL16.fna   | LcRL31.fna    | 87.4   | [83.9 - 90.3] | 97.2   | [96.1 - 98.0] | 91.7   | [89.1 - 93.7] | 0.65             |
| LcRL16.fna   | LcRL33.fna    | 80.7   | [76.8 - 84.1] | 97.2   | [96.1 - 98.0] | 86.4   | [83.3 - 89.0] | 0.33             |
| LcRL14.fna   | LcRL19.fna    | 85.0   | [81.3 - 88.1] | 97.2   | [96.0 - 98.0] | 89.8   | [87.0 - 92.0] | 0.86             |
| LcRL16.fna   | LcRL32.fna    | 87.2   | [83.7 - 90.1] | 97.1   | [96.0 - 98.0] | 91.5   | [89.0 - 93.5] | 0.69             |
| LcRL16.fna   | LcRL30.fna    | 87.9   | [84.4 - 90.7] | 97.1   | [96.0 - 97.9] | 92.0   | [89.5 - 93.9] | 0.36             |
| LcRL14.fna   | LcRL26.fna    | 85.4   | [81.7 - 88.5] | 97.1   | [95.9 - 97.9] | 90.1   | [87.4 - 92.3] | 0.63             |
| LcRL14.fna   | LcRL29.fna    | 85.0   | [81.2 - 88.1] | 97.0   | [95.9 - 97.6] | 89.8   | [87.0 - 92.0] | 0.35             |
| LcRL16.fna   | LcRL24.fna    | 83.1   | [79.3 - 86.4] | 96.9   | [95.8 - 97.8] | 88.3   | [85.3 - 90.7] | 0.16             |
| LcRL15.fna   | LcRL16.fna    | 86.6   | [83.0 - 89.6] | 96.8   | [95.6 - 97.7] | 91.0   | [88.4 - 93.1] | 0.61             |
| LcRL16.fna   | LcRL17.fna    | 83.7   | [79.9 - 86.9] | 96.8   | [95.6 - 97.7] | 88.7   | [85.8 - 91.1] | 1.79             |
| LcRL14.fna   | LcRL24.fna    | 81.0   | [77.1 - 84.4] | 96.8   | [95.6 - 97.7] | 86.5   | [83.5 - 89.1] | 0.05             |
| Query     | Subject      | \(d_0\) | C.I. \(d_0\) | \(d_4\) | C.I. \(d_4\) | \(d_5\) | C.I. \(d_5\) | Diff. G+C Percent |
|-----------|--------------|---------|--------------|---------|--------------|---------|--------------|------------------|
| 'LcRL21.fna' | 'LcRL33.fna' | 93.3    | [90.7 - 95.3] | 96.7    | [95.5 - 97.6] | 95.8    | [94.1 - 97.1] | 0.29             |
| 'LcRL27.fna' | 'LcRL31.fna' | 86.9    | [83.3 - 89.8] | 96.7    | [95.5 - 97.6] | 91.2    | [88.6 - 93.2] | 0.05             |
| 'LcRL27.fna' | 'LcRL32.fna' | 87.0    | [83.4 - 89.9] | 96.7    | [95.4 - 97.6] | 91.3    | [88.7 - 93.3] | 0.00             |
| 'LcRL21.fna' | 'LcRL32.fna' | 86.8    | [83.2 - 89.7] | 96.7    | [95.4 - 97.6] | 91.1    | [88.5 - 93.2] | 0.08             |
| 'LcRL21.fna' | 'LcRL31.fna' | 86.7    | [83.1 - 89.6] | 96.7    | [95.4 - 97.6] | 91.0    | [88.4 - 93.1] | 0.03             |
| 'LcRL27.fna' | 'LcRL33.fna' | 92.9    | [90.2 - 95.0] | 96.7    | [95.5 - 97.6] | 95.6    | [93.8 - 96.9] | 0.37             |
| 'LcRL21.fna' | 'LcRL26.fna' | 86.0    | [82.3 - 89.0] | 96.6    | [95.3 - 97.5] | 90.5    | [87.8 - 92.6] | 0.22             |
| 'LcRL19.fna' | 'LcRL21.fna' | 85.7    | [82.0 - 88.7] | 96.6    | [95.4 - 97.6] | 90.2    | [87.5 - 92.4] | 0.46             |
| 'LcRL19.fna' | 'LcRL27.fna' | 85.4    | [81.7 - 88.4] | 96.6    | [95.4 - 97.5] | 90.0    | [87.2 - 92.2] | 0.38             |
| 'LcRL21.fna' | 'LcRL30.fna' | 87.8    | [84.3 - 90.6] | 96.6    | [95.3 - 97.5] | 91.8    | [89.3 - 93.8] | 0.25             |
| 'LcRL27.fna' | 'LcRL29.fna' | 85.3    | [81.6 - 88.3] | 96.5    | [95.2 - 97.4] | 89.9    | [87.1 - 92.1] | 0.14             |
| 'LcRL27.fna' | 'LcRL30.fna' | 87.4    | [83.9 - 90.3] | 96.5    | [95.3 - 97.5] | 91.6    | [89.0 - 93.6] | 0.33             |
| 'LcRL21.fna' | 'LcRL29.fna' | 85.6    | [81.9 - 88.6] | 96.5    | [95.2 - 97.5] | 90.1    | [87.4 - 92.3] | 0.05             |
| 'LcRL26.fna' | 'LcRL27.fna' | 85.7    | [82.0 - 88.7] | 96.5    | [95.3 - 97.5] | 90.2    | [87.5 - 92.4] | 0.14             |
| 'LcRL14.fna' | 'LcRL23.fna' | 90.4    | [87.2 - 92.6] | 96.4    | [95.1 - 97.3] | 93.7    | [91.5 - 95.4] | 0.05             |
| 'LcRL14.fna' | 'LcRL32.fna' | 87.3    | [83.7 - 90.1] | 96.4    | [95.1 - 97.3] | 91.4    | [88.8 - 93.4] | 0.48             |
| 'LcRL15.fna' | 'LcRL21.fna' | 86.5    | [82.9 - 89.5] | 96.3    | [95.0 - 97.3] | 90.8    | [88.2 - 92.9] | 0.01             |
| 'LcRL17.fna' | 'LcRL27.fna' | 83.5    | [79.7 - 86.7] | 96.3    | [95.0 - 97.3] | 88.5    | [85.5 - 90.9] | 1.09             |
| 'LcRL17.fna' | 'LcRL21.fna' | 83.9    | [80.1 - 87.1] | 96.3    | [95.0 - 97.3] | 88.8    | [85.9 - 91.1] | 1.18             |
| 'LcRL14.fna' | 'LcRL31.fna' | 87.3    | [83.7 - 90.1] | 96.3    | [95.0 - 97.3] | 91.4    | [88.8 - 93.4] | 0.44             |
| 'LcRL14.fna' | 'LcRL25.fna' | 90.2    | [87.0 - 92.7] | 96.3    | [95.0 - 97.3] | 93.6    | [91.4 - 95.3] | 0.12             |
| 'LcRL15.fna' | 'LcRL27.fna' | 86.1    | [82.4 - 89.1] | 96.3    | [94.9 - 97.3] | 90.5    | [87.8 - 92.6] | 0.09             |
| 'LcRL14.fna' | 'LcRL27.fna' | 83.1    | [79.3 - 86.3] | 95.9    | [94.4 - 96.9] | 88.1    | [85.1 - 90.5] | 0.48             |
| 'LcRL16.fna' | 'LcRL27.fna' | 77.2    | [73.2 - 80.7] | 95.9    | [94.5 - 97.0] | 83.1    | [79.9 - 86.0] | 0.7              |
| 'LcRL16.fna' | 'LcRL21.fna' | 77.4    | [73.4 - 80.9] | 95.9    | [94.5 - 97.0] | 83.3    | [80.1 - 86.2] | 0.62             |
| 'LcRL14.fna' | 'LcRL21.fna' | 83.2    | [79.4 - 86.4] | 95.8    | [94.4 - 96.9] | 88.1    | [85.2 - 90.6] | 0.4              |
| 'LcRL24.fna' | 'LcRL27.fna' | 93.4    | [90.7 - 95.3] | 95.6    | [94.1 - 96.7] | 95.7    | [93.9 - 97.0] | 0.54             |
| Query   | Subject                              | $d_0$   | C.I. $d_0$ | $d_4$   | C.I. $d_4$ | $d_5$   | C.I. $d_5$ | Diff. G+C | Percent  |
|---------|--------------------------------------|---------|------------|---------|------------|---------|------------|-----------|----------|
| 'LcRL21.fna' | 'LcRL24.fna'                         | 93.8    | [91.2 - 95.7] | 95.6    | [94.1 - 96.7] | 96.0    | [94.3 - 97.2] | 0.46      |          |
| 'LcRL14.fna' | 'LcRL30.fna'                         | 87.8    | [84.3 - 90.6] | 95.5    | [94.0 - 96.6] | 91.7    | [89.2 - 93.7] | 0.15      |          |
| 'LcRL14.fna' | 'LcRL15.fna'                         | 86.6    | [83.0 - 89.6] | 95.2    | [93.6 - 96.4] | 90.7    | [88.1 - 92.9] | 0.4       |          |
| 'LcRL11.fna' | 'LcRL13.fna'                         | 99.8    | [99.5 - 99.9] | 95.2    | [93.6 - 96.4] | 99.8    | [99.6 - 99.9] | 0.19      |          |
| 'LcRL14.fna' | 'LcRL17.fna'                         | 83.5    | [79.6 - 86.7] | 95.1    | [93.5 - 96.3] | 88.2    | [85.3 - 90.7] | 1.58      |          |
| 'LcRL14.fna' | 'LcRL16.fna'                         | 89.7    | [86.4 - 92.3] | 94.7    | [93.1 - 96.0] | 93.0    | [90.6 - 94.8] | 0.21      |          |
| 'LcRL28.fna' | Lactobacillus crispatus JCM 1185     | 66.1    | [62.3 - 69.8] | 77.3    | [74.3 - 80.0] | 70.1    | [66.7 - 73.4] | 0.71      |          |
| 'LcRL23.fna' | Lactobacillus crispatus JCM 1185     | 62.0    | [58.3 - 65.6] | 77.1    | [74.1 - 79.8] | 66.2    | [62.9 - 69.5] | 0.28      |          |
| 'LcRL11.fna' | Lactobacillus crispatus JCM 1185     | 67.5    | [63.6 - 71.2] | 76.9    | [73.9 - 79.7] | 71.4    | [67.9 - 74.6] | 0.38      |          |
| 'LcRL18.fna' | Lactobacillus crispatus JCM 1185     | 59.5    | [55.8 - 63.0] | 76.6    | [73.7 - 79.4] | 63.7    | [60.4 - 66.9] | 0.02      |          |
| 'LcRL24.fna' | Lactobacillus crispatus JCM 1185     | 63.7    | [60.0 - 67.3] | 76.6    | [73.6 - 79.3] | 67.8    | [64.4 - 71.0] | 0.18      |          |
| 'LcRL32.fna' | Lactobacillus crispatus JCM 1185     | 65.8    | [62.0 - 69.4] | 76.6    | [73.6 - 79.3] | 69.7    | [66.3 - 73.0] | 0.71      |          |
| 'LcRL13.fna' | Lactobacillus crispatus JCM 1185     | 66.6    | [62.8 - 70.2] | 76.8    | [73.8 - 79.5] | 70.5    | [67.0 - 73.7] | 0.57      |          |
| 'LcRL16.fna' | Lactobacillus crispatus JCM 1185     | 59.5    | [55.8 - 63.0] | 76.6    | [73.7 - 79.4] | 63.7    | [60.4 - 66.9] | 0.02      |          |
| 'LcRL19.fna' | Lactobacillus crispatus JCM 1185     | 63.0    | [59.2 - 66.6] | 76.5    | [73.5 - 79.3] | 67.1    | [63.7 - 70.3] | 1.81      |          |
| 'LcRL18.fna' | Lactobacillus crispatus JCM 1185     | 67.3    | [63.4 - 70.9] | 76.4    | [73.4 - 79.2] | 71.1    | [67.6 - 74.3] | 1.1       |          |
| 'LcRL17.fna' | Lactobacillus crispatus JCM 1185     | 65.6    | [61.7 - 69.2] | 76.4    | [73.4 - 79.2] | 69.5    | [66.0 - 72.7] | 0.67      |          |
| 'LcRL20.fna' | Lactobacillus crispatus JCM 1185     | 62.9    | [59.2 - 66.5] | 76.4    | [73.4 - 79.2] | 67.0    | [63.6 - 70.2] | 0.02      |          |
| 'LcRL30.fna' | Lactobacillus crispatus JCM 1185     | 68.5    | [64.6 - 72.1] | 76.3    | [73.3 - 79.1] | 72.1    | [68.7 - 75.3] | 0.39      |          |
| 'LcRL14.fna' | Lactobacillus crispatus JCM 1185     | 59.6    | [56.0 - 63.2] | 76.2    | [73.2 - 79.0] | 63.8    | [60.5 - 67.0] | 0.23      |          |
| 'LcRL33.fna' | Lactobacillus crispatus JCM 1185     | 64.3    | [60.5 - 67.9] | 76.2    | [73.2 - 79.0] | 68.3    | [64.8 - 71.5] | 0.35      |          |
| 'LcRL15.fna' | Lactobacillus crispatus JCM 1185     | 67.6    | [63.8 - 71.3] | 76.1    | [73.1 - 78.8] | 71.3    | [67.9 - 74.6] | 0.63      |          |
| 'LcRL27.fna' | Lactobacillus crispatus JCM 1185     | 59.7    | [56.0 - 63.2] | 76.0    | [73.0 - 78.8] | 63.8    | [60.5 - 67.1] | 0.72      |          |
| 'LcRL21.fna' | Lactobacillus crispatus JCM 1185     | 59.9    | [56.3 - 63.5] | 76.0    | [73.0 - 78.8] | 64.1    | [60.7 - 67.3] | 0.64      |          |
| 'LcRL13.fna' | Lactobacillus gallinarum JCM 2011    | 31.8    | [28.4 - 35.4] | 25.0    | [22.7 - 27.5] | 29.1    | [26.2 - 32.2] | 0.68      |          |
| Query     | Subject                   | $d_0$  | C.I. $d_0$ | $d_4$  | C.I. $d_4$ | $d_5$  | C.I. $d_5$ | Diff. G+C Percent |
|-----------|---------------------------|--------|-----------|--------|-----------|--------|-----------|-------------------|
| `LcRL11.fna` | Lactobacillus gallinarum JCM 2011 | 31.4   | [28.1 - 35.0] | 24.9   | [22.6 - 27.4] | 28.8   | [25.9 - 31.9] | 0.49              |
| `LcRL27.fna` | Lactobacillus gallinarum JCM 2011 | 29.3   | [25.9 - 32.9] | 24.9   | [22.6 - 27.4] | 27.2   | [24.3 - 30.3] | 0.83              |
| `LcRL20.fna` | Lactobacillus gallinarum JCM 2011 | 30.0   | [26.6 - 33.6] | 24.9   | [22.6 - 27.4] | 27.7   | [24.8 - 30.8] | 0.09              |
| `LcRL21.fna` | Lactobacillus gallinarum JCM 2011 | 29.4   | [26.0 - 33.0] | 24.9   | [22.5 - 27.3] | 27.3   | [24.4 - 30.4] | 0.75              |
| `LcRL14.fna` | Lactobacillus gallinarum JCM 2011 | 29.1   | [25.7 - 32.7] | 24.9   | [22.5 - 27.3] | 27.1   | [24.2 - 30.2] | 0.35              |
| `LcRL29.fna` | Lactobacillus gallinarum JCM 2011 | 31.7   | [28.3 - 35.3] | 24.9   | [22.6 - 27.4] | 29.1   | [26.1 - 32.2] | 0.7               |
| `LcRL31.fna` | Lactobacillus gallinarum JCM 2011 | 30.9   | [27.5 - 34.5] | 24.9   | [22.6 - 27.4] | 28.5   | [25.5 - 31.6] | 0.79              |
| `LcRL28.fna` | Lactobacillus gallinarum JCM 2011 | 31.6   | [28.2 - 35.2] | 24.9   | [22.6 - 27.4] | 29.0   | [26.0 - 32.1] | 0.83              |
| `LcRL33.fna` | Lactobacillus gallinarum JCM 2011 | 30.5   | [27.1 - 34.1] | 24.9   | [22.6 - 27.4] | 28.1   | [25.2 - 31.2] | 0.46              |
| `LcRL32.fna` | Lactobacillus gallinarum JCM 2011 | 31.0   | [27.7 - 34.6] | 24.8   | [22.5 - 27.3] | 28.5   | [25.6 - 31.6] | 0.83              |
| `LcRL19.fna` | Lactobacillus gallinarum JCM 2011 | 31.3   | [27.9 - 34.9] | 24.8   | [22.5 - 27.3] | 28.7   | [25.8 - 31.8] | 1.21              |
| `LcRL30.fna` | Lactobacillus gallinarum JCM 2011 | 31.2   | [27.8 - 34.8] | 24.8   | [22.4 - 27.2] | 28.6   | [25.7 - 31.7] | 0.5               |
| `LcRL16.fna` | Lactobacillus gallinarum JCM 2011 | 29.1   | [25.8 - 32.7] | 24.8   | [22.5 - 27.3] | 27.1   | [24.2 - 30.2] | 0.14              |
| `LcRL26.fna` | Lactobacillus gallinarum JCM 2011 | 31.3   | [28.0 - 34.9] | 24.7   | [22.4 - 27.2] | 28.7   | [25.8 - 31.8] | 0.97              |
| `LcRL17.fna` | Lactobacillus gallinarum JCM 2011 | 29.9   | [26.5 - 34.9] | 24.7   | [22.3 - 27.1] | 27.6   | [24.7 - 30.7] | 1.93              |
| `LcRL24.fna` | Lactobacillus gallinarum JCM 2011 | 30.3   | [26.9 - 33.9] | 24.6   | [22.3 - 27.1] | 27.9   | [25.0 - 31.0] | 0.29              |
| `LcRL15.fna` | Lactobacillus gallinarum JCM 2011 | 31.0   | [27.7 - 34.6] | 24.6   | [22.3 - 27.1] | 28.5   | [25.6 - 31.6] | 0.75              |
| `LcRL23.fna` | Lactobacillus gallinarum JCM 2011 | 31.1   | [27.7 - 34.7] | 24.6   | [22.3 - 27.1] | 28.5   | [25.6 - 31.6] | 0.4               |
| `LcRL25.fna` | Lactobacillus gallinarum JCM 2011 | 31.1   | [27.8 - 34.7] | 24.6   | [22.3 - 27.1] | 28.6   | [25.6 - 31.7] | 0.47              |
| `LcRL27.fna` | Lactobacillus suntoryeus LMG 22464 | 27.5   | [24.2 - 31.2] | 24.4   | [22.1 - 26.9] | 25.8   | [22.9 - 28.9] | 0.78              |
| `LcRL11.fna` | Lactobacillus suntoryeus LMG 22464 | 30.3   | [26.9 - 33.9] | 24.4   | [22.0 - 26.8] | 27.9   | [25.0 - 31.0] | 0.44              |
| `LcRL11.fna` | Lactobacillus amylovorus DSM 20531 | 32.4   | [29.0 - 35.9] | 24.4   | [22.0 - 26.8] | 29.4   | [26.5 - 32.5] | 0.81              |
| `LcRL28.fna` | Lactobacillus suntoryeus LMG 22464 | 30.1   | [26.7 - 33.7] | 24.4   | [22.1 - 26.9] | 27.7   | [24.8 - 30.8] | 0.78              |
| `LcRL16.fna` | Lactobacillus suntoryeus LMG 22464 | 27.8   | [24.5 - 31.5] | 24.4   | [22.0 - 26.8] | 26.0   | [23.1 - 29.1] | 0.09              |
| `LcRL26.fna` | Lactobacillus suntoryeus LMG 22464 | 29.6   | [26.2 - 33.2] | 24.4   | [22.1 - 26.9] | 27.3   | [24.4 - 30.4] | 0.92              |
| `LcRL33.fna` | Lactobacillus suntoryeus LMG 22464 | 29.0   | [25.7 - 32.7] | 24.4   | [22.1 - 26.9] | 26.9   | [24.0 - 30.0] | 0.41              |
| `LcRL14.fna` | Lactobacillus suntoryeus LMG 22464 | 27.4   | [24.1 - 31.1] | 24.4   | [22.1 - 26.9] | 25.7   | [22.8 - 28.8] | 0.3               |
| Query   | Subject                              | $d_0$ | C.I. $d_0$ | $d_4$ | C.I. $d_4$ | $d_5$ | C.I. $d_5$ | Diff. G+C Percent |
|---------|--------------------------------------|-------|------------|-------|------------|-------|------------|------------------|
| 'LcRL13.fna' | Lactobacillus amylovorus LMG 22464 | 30.2  | [26.9 - 33.8] | 24.4  | [22.1 - 26.9] | 27.9  | [24.0 - 30.9] | 0.63             |
| 'LcRL20.fna' | Lactobacillus amylovorus DSM 20531    | 29.7  | [26.4 - 33.3] | 24.3  | [22.0 - 26.7] | 27.4  | [24.5 - 30.5] | 0.45             |
| 'LcRL33.fna' | Lactobacillus amylovorus DSM 20531    | 31.5  | [28.1 - 35.0] | 24.3  | [22.0 - 26.8] | 28.7  | [25.8 - 31.8] | 0.84             |
| 'LcRL22.fna' | Lactobacillus amylovorus DSM 20531    | 28.7  | [25.3 - 32.3] | 24.3  | [22.0 - 26.7] | 26.6  | [23.7 - 29.7] | 1.16             |
| 'LcRL21.fna' | Lactobacillus amylovorus DSM 20531    | 27.6  | [24.2 - 31.2] | 24.4  | [22.0 - 26.6] | 25.8  | [22.9 - 28.9] | 0.7              |
| 'LcRL18.fna' | Lactobacillus amylovorus DSM 20531    | 32.9  | [29.5 - 36.4] | 24.3  | [22.0 - 26.8] | 29.8  | [26.8 - 32.9] | 0.62             |
| 'LcRL24.fna' | Lactobacillus amylovorus DSM 20531    | 31.7  | [28.3 - 35.2] | 24.2  | [21.9 - 26.7] | 29.2  | [25.9 - 31.9] | 0.47             |
| 'LcRL23.fna' | Lactobacillus amylovorus DSM 20531    | 32.2  | [28.8 - 35.8] | 24.3  | [22.0 - 26.8] | 29.3  | [26.3 - 32.4] | 0.33             |
| Query   | Subject                        | $d_0$ | C.I. $d_0$ | $d_4$ | C.I. $d_4$ | $d_s$ | C.I. $d_s$ | Diff. G+C Percent |
|---------|--------------------------------|-------|------------|-------|------------|-------|------------|------------------|
| LcRL3.fna | Lactobacillus sobrius DSM 16698 | 31.7  | [28.3 - 35.3] | 24.2  | [21.9 - 26.7] | 28.8  | [25.9 - 32.0] | 0.67             |
| LcRL21.fna | Lactobacillus amylovorus DSM 20531 | 30.0  | [26.6 - 33.6] | 24.2  | [21.9 - 26.7] | 27.6  | [24.7 - 30.7] | 0.55             |
| LcRL23.fna | Lactobacillus amylovorus DSM 20531 | 31.6  | [28.2 - 35.2] | 24.2  | [21.9 - 26.7] | 28.8  | [25.8 - 31.9] | 0.9              |
| LcRL11.fna | Lactobacillus sobrius DSM 16698 | 31.6  | [28.2 - 35.1] | 24.2  | [21.8 - 26.6] | 28.7  | [25.8 - 31.8] | 0.86             |
| LcRL27.fna | Lactobacillus amylovorus DSM 20531 | 29.7  | [26.3 - 33.3] | 24.2  | [21.9 - 26.7] | 27.4  | [24.4 - 30.5] | 0.47             |
| LcRL25.fna | Lactobacillus amylovorus DSM 20531 | 31.6  | [28.3 - 35.2] | 24.2  | [21.9 - 26.6] | 28.8  | [25.9 - 31.9] | 0.83             |
| LcRL31.fna | Lactobacillus amylovorus DSM 20531 | 31.5  | [28.1 - 35.1] | 24.2  | [21.9 - 26.7] | 28.7  | [25.8 - 31.8] | 0.51             |
| LcRL16.fna | Lactobacillus kitasatonis JCM 1039 | 29.2  | [25.8 - 32.8] | 24.1  | [21.8 - 26.6] | 27.0  | [24.1 - 30.1] | 0.89             |
| LcRL25.fna | Lactobacillus kitasatonis JCM 1039 | 31.0  | [27.7 - 34.6] | 24.1  | [21.8 - 26.5] | 28.3  | [25.4 - 31.5] | 0.56             |
| LcRL15.fna | Lactobacillus amylovorus DSM 20531 | 31.8  | [28.5 - 35.4] | 24.1  | [21.8 - 26.6] | 28.9  | [26.0 - 32.0] | 0.55             |
| LcRL14.fna | Lactobacillus kitasatonis JCM 1039 | 29.4  | [26.0 - 33.0] | 24.1  | [21.8 - 26.6] | 27.1  | [24.2 - 30.2] | 0.68             |
| LcRL32.fna | Lactobacillus kitasatonis JCM 1039 | 31.2  | [27.8 - 34.8] | 24.1  | [21.8 - 26.6] | 28.5  | [25.6 - 31.6] | 0.2              |
| LcRL23.fna | Lactobacillus kitasatonis JCM 1039 | 31.1  | [27.8 - 34.7] | 24.1  | [21.8 - 26.6] | 28.4  | [25.5 - 31.5] | 0.63             |
| LcRL28.fna | Lactobacillus kitasatonis JCM 1039 | 32.1  | [28.7 - 35.6] | 24.1  | [21.8 - 26.6] | 29.1  | [26.2 - 32.2] | 0.2              |
| LcRL19.fna | Lactobacillus helveticus DSM 20075 | 26.9  | [23.5 - 30.5] | 24.1  | [21.7 - 26.5] | 25.2  | [22.3 - 28.3] | 0.93             |
| LcRL26.fna | Lactobacillus helveticus DSM 20075 | 27.0  | [23.6 - 30.6] | 24.1  | [21.8 - 26.6] | 25.3  | [22.4 - 28.4] | 0.69             |
| LcRL19.fna | Lactobacillus sobrius DSM 16698 | 31.0  | [27.6 - 34.6] | 24.1  | [21.8 - 26.5] | 28.3  | [25.4 - 31.4] | 0.14             |
| LcRL21.fna | Lactobacillus helveticus DSM 20075 | 25.2  | [21.9 - 28.9] | 24.1  | [21.8 - 26.6] | 23.9  | [21.1 - 27.0] | 0.47             |
| LcRL28.fna | Lactobacillus helveticus DSM 20075 | 27.3  | [23.9 - 30.9] | 24.1  | [21.8 - 26.6] | 25.5  | [22.6 - 28.6] | 0.55             |
| LcRL29.fna | Lactobacillus kitasatonis JCM 1039 | 31.6  | [28.2 - 35.2] | 24.1  | [21.8 - 26.6] | 28.8  | [25.9 - 31.9] | 0.33             |
| LcRL16.fna | Lactobacillus sobrius DSM 16698 | 29.2  | [25.8 - 32.8] | 24.1  | [21.8 - 26.5] | 26.9  | [24.0 - 30.0] | 1.22             |
| LcRL33.fna | Lactobacillus kitasatonis JCM 1039 | 30.7  | [27.3 - 34.3] | 24.1  | [21.8 - 26.5] | 28.1  | [25.2 - 31.2] | 0.57             |
| LcRL20.fna | Lactobacillus helveticus DSM 20075 | 26.1  | [22.8 - 29.7] | 24.1  | [21.8 - 26.5] | 24.6  | [21.7 - 27.7] | 0.19             |
| LcRL31.fna | Lactobacillus kitasatonis JCM 1039 | 31.0  | [27.6 - 34.6] | 24.1  | [21.8 - 26.5] | 28.3  | [25.4 - 31.4] | 0.25             |
| LcRL26.fna | Lactobacillus kitasatonis JCM 1039 | 31.5  | [28.1 - 35.1] | 24.1  | [21.8 - 26.6] | 28.7  | [25.8 - 31.8] | 0.06             |
| LcRL20.fna | Lactobacillus sobrius DSM 16698 | 30.0  | [26.7 - 33.6] | 24.1  | [21.8 - 26.5] | 27.6  | [24.7 - 30.7] | 1.27             |
| LcRL14.fna | Lactobacillus sobrius DSM 16698 | 29.3  | [25.9 - 32.9] | 24.1  | [21.7 - 26.5] | 27.0  | [24.1 - 30.1] | 1.01             |
| Query         | Subject                             | $d_0$   | C.I. $d_0$ | $d_4$   | C.I. $d_4$ | $d_5$   | C.I. $d_5$ | Diff. G+C Percent |
|--------------|-------------------------------------|---------|------------|---------|------------|---------|------------|-------------------|
| LcRL17.fna   | Lactobacillus amylovorus DSM 20531  | 30.8    | [27.4 - 34.4] | 24.1    | [21.8 - 26.6] | 28.2    | [25.3 - 31.3] | 0.63              |
| LcRL13.fna   | Lactobacillus kitasatonis JCM 1039 | 32.0    | [28.6 - 35.5] | 24.1    | [21.8 - 26.6] | 29.0    | [26.1 - 32.1] | 0.35              |
| LcRL27.fna   | Lactobacillus helveticus DSM 20075 | 25.1    | [21.8 - 28.8] | 24.1    | [21.8 - 26.6] | 23.8    | [21.0 - 26.9] | 0.55              |
| LcRL24.fna   | Lactobacillus helveticus DSM 20075 | 30.5    | [27.1 - 34.1] | 24.1    | [21.8 - 26.6] | 27.9    | [25.0 - 31.1] | 0.74              |
| LcRL13.fna   | Lactobacillus kitasatonis JCM 1039 | 27.4    | [24.0 - 31.0] | 24.1    | [21.8 - 26.6] | 25.6    | [22.7 - 28.7] | 0.4               |
| LcRL11.fna   | Lactobacillus helveticus DSM 20075 | 27.6    | [24.2 - 31.2] | 24.1    | [21.8 - 26.6] | 25.7    | [22.8 - 28.8] | 0.21              |
| LcRL33.fna   | Lactobacillus sobrius DSM 16698    | 30.5    | [27.1 - 34.1] | 24.1    | [21.7 - 26.6] | 27.9    | [25.0 - 31.0] | 0.89              |
| LcRL14.fna   | Lactobacillus helveticus DSM 20075 | 25.3    | [22.0 - 29.0] | 24.1    | [21.8 - 26.6] | 24.0    | [21.1 - 27.1] | 0.07              |
| LcRL19.fna   | Lactobacillus kitasatonis JCM 1039 | 31.2    | [27.8 - 34.8] | 24.1    | [21.8 - 26.6] | 28.5    | [25.6 - 31.6] | 0.18              |
| LcRL21.fna   | Lactobacillus kitasatonis JCM 1039 | 29.4    | [26.1 - 33.0] | 24.1    | [21.8 - 26.6] | 27.1    | [24.2 - 30.2] | 0.28              |
| LcRL27.fna   | Lactobacillus sobrius DSM 16698    | 29.1    | [25.7 - 32.7] | 24.1    | [21.8 - 26.6] | 26.9    | [24.0 - 30.0] | 0.52              |
| LcRL27.fna   | Lactobacillus kitasatonis JCM 1039 | 29.3    | [25.9 - 32.9] | 24.1    | [21.8 - 26.6] | 27.0    | [24.1 - 30.1] | 0.2               |
| LcRL17.fna   | Lactobacillus helveticus DSM 20075 | 26.1    | [22.7 - 29.7] | 24.0    | [21.7 - 26.5] | 24.6    | [21.7 - 27.7] | 1.65              |
| LcRL17.fna   | Lactobacillus sobrius DSM 16698    | 30.1    | [26.8 - 33.8] | 24.0    | [21.7 - 26.4] | 27.7    | [24.7 - 30.8] | 0.57              |
| LcRL31.fna   | Lactobacillus helveticus DSM 20075 | 26.5    | [23.2 - 30.2] | 24.0    | [21.7 - 26.5] | 24.9    | [22.0 - 28.0] | 0.5               |
| LcRL20.fna   | Lactobacillus kitasatonis JCM 1039 | 30.8    | [27.4 - 34.4] | 24.0    | [21.7 - 26.5] | 28.1    | [25.2 - 31.3] | 0.94              |
| LcRL30.fna   | Lactobacillus sobrius DSM 16698    | 31.1    | [27.7 - 34.7] | 24.0    | [21.7 - 26.5] | 28.4    | [25.5 - 31.5] | 0.85              |
| LcRL32.fna   | Lactobacillus helveticus DSM 20075 | 26.7    | [23.4 - 30.4] | 24.0    | [21.7 - 26.5] | 25.1    | [22.2 - 28.2] | 0.55              |
| LcRL17.fna   | Lactobacillus kitasatonis JCM 1039 | 30.6    | [27.2 - 34.2] | 24.0    | [21.7 - 26.5] | 28.0    | [25.1 - 31.1] | 0.9               |
| LcRL25.fna   | Lactobacillus sobrius DSM 16698    | 30.9    | [27.5 - 34.5] | 24.0    | [21.7 - 26.5] | 28.2    | [25.3 - 31.3] | 0.89              |
| LcRL21.fna   | Lactobacillus sobrius DSM 16698    | 29.2    | [25.8 - 32.8] | 24.0    | [21.7 - 26.5] | 27.0    | [24.1 - 30.1] | 0.6               |
| LcRL24.fna   | Lactobacillus sobrius DSM 16698    | 30.4    | [27.0 - 34.0] | 24.0    | [21.7 - 26.5] | 27.9    | [25.0 - 31.0] | 1.06              |
| LcRL30.fna   | Lactobacillus helveticus DSM 20075 | 26.8    | [23.4 - 30.4] | 24.0    | [21.7 - 26.5] | 25.1    | [22.2 - 28.2] | 0.22              |
| LcRL29.fna   | Lactobacillus helveticus DSM 20075 | 27.3    | [23.9 - 30.9] | 24.0    | [21.7 - 26.5] | 25.5    | [22.6 - 28.6] | 0.42              |
| LcRL29.fna   | Lactobacillus sobrius DSM 16698    | 31.4    | [28.0 - 35.0] | 24.0    | [21.7 - 26.5] | 28.6    | [25.7 - 31.7] | 0.66              |
| LcRL26.fna   | Lactobacillus sobrius DSM 16698    | 31.3    | [27.9 - 34.9] | 24.0    | [21.7 - 26.5] | 28.5    | [25.6 - 31.6] | 0.38              |
| LcRL16.fna   | Lactobacillus helveticus DSM 20075 | 25.7    | [22.3 - 29.3] | 24.0    | [21.7 - 26.5] | 24.2    | [21.4 - 27.3] | 0.15              |
| Query          | Subject                                          | d₀         | C.I. d₀   | d₄         | C.I. d₄   | d₅         | C.I. d₅   | Diff. G+C Percent |
|---------------|--------------------------------------------------|------------|-----------|------------|-----------|------------|-----------|------------------|
| 'LcRL23.fna'  | Lactobacillus sobrius DSM 16698                   | 31.2       | [27.8 - 34.8] | 24.0       | [21.7 - 26.5] | 28.4       | [25.5 - 31.5] | 0.96             |
| 'LcRL32.fna'  | Lactobacillus sobrius DSM 16698                   | 31.0       | [27.6 - 34.6] | 24.0       | [21.7 - 26.4] | 28.3       | [25.4 - 31.4] | 0.53             |
| 'LcRL31.fna'  | Lactobacillus sobrius DSM 16698                   | 30.9       | [27.5 - 34.5] | 24.0       | [21.7 - 26.5] | 28.2       | [25.3 - 31.4] | 0.57             |
| 'LcRL15.fna'  | Lactobacillus kitasatonis JCM 1039                | 31.5       | [28.1 - 35.1] | 24.0       | [21.7 - 26.5] | 28.7       | [25.8 - 31.8] | 0.28             |
| 'LcRL24.fna'  | Lactobacillus helveticus DSM 20075                | 26.4       | [23.0 - 30.0] | 24.0       | [21.7 - 26.5] | 24.8       | [21.9 - 27.9] | 0.01             |
| 'LcRL23.fna'  | Lactobacillus helveticus DSM 20075                | 26.8       | [23.5 - 30.5] | 24.0       | [21.7 - 26.4] | 25.1       | [22.2 - 28.2] | 0.12             |
| 'LcRL25.fna'  | Lactobacillus helveticus DSM 20075                | 26.9       | [23.6 - 30.5] | 24.0       | [21.7 - 26.4] | 25.2       | [22.3 - 28.3] | 0.19             |
| 'LcRL33.fna'  | Lactobacillus helveticus DSM 20075                | 26.5       | [23.2 - 30.1] | 24.0       | [21.7 - 26.5] | 24.9       | [22.0 - 28.0] | 0.18             |
| 'LcRL15.fna'  | Lactobacillus helveticus DSM 20075                | 26.7       | [23.4 - 30.4] | 24.0       | [21.7 - 26.5] | 25.1       | [22.2 - 28.2] | 0.46             |
| 'LcRL30.fna'  | Lactobacillus kitasatonis JCM 1039                | 31.7       | [28.3 - 35.3] | 24.0       | [21.7 - 26.5] | 28.8       | [25.9 - 31.9] | 0.53             |
| 'LcRL15.fna'  | Lactobacillus sobrius DSM 16698                   | 31.1       | [27.8 - 34.7] | 23.9       | [21.6 - 26.4] | 28.4       | [25.5 - 31.5] | 0.61             |
| 'LcRL11.fna'  | Lactobacillus ultunensis DSM 16047                | 28.3       | [25.0 - 32.0] | 23.5       | [21.2 - 25.9] | 26.2       | [23.3 - 29.3] | 1.03             |
| 'LcRL26.fna'  | Lactobacillus kefiranofaciens ATCC 43761          | 28.0       | [24.6 - 31.6] | 23.5       | [21.2 - 26.0] | 25.9       | [23.1 - 29.0] | 0.23             |
| 'LcRL16.fna'  | Lactobacillus kefiranofaciens ATCC 43761          | 26.3       | [23.0 - 30.0] | 23.5       | [21.2 - 25.9] | 24.7       | [21.8 - 27.8] | 0.6              |
| 'LcRL33.fna'  | Lactobacillus kefiranofaciens ATCC 43761          | 27.5       | [24.1 - 31.1] | 23.5       | [21.2 - 26.0] | 25.5       | [22.7 - 28.6] | 0.28             |
| 'LcRL27.fna'  | Lactobacillus kefiranofaciens ATCC 43761          | 26.2       | [22.9 - 29.9] | 23.5       | [21.2 - 26.0] | 24.6       | [21.7 - 27.7] | 0.09             |
| 'LcRL11.fna'  | Lactobacillus kefiranofaciens ATCC 43761          | 28.2       | [24.8 - 31.8] | 23.5       | [21.2 - 26.0] | 26.1       | [23.2 - 29.2] | 0.25             |
| 'LcRL29.fna'  | Lactobacillus ultunensis DSM 16047                | 28.6       | [25.3 - 32.3] | 23.5       | [21.2 - 26.0] | 26.4       | [23.5 - 29.8] | 1.24             |
| 'LcRL29.fna'  | Lactobacillus kefiranofaciens ATCC 43761          | 28.5       | [25.1 - 32.1] | 23.5       | [21.2 - 25.9] | 26.3       | [23.4 - 29.4] | 0.04             |
| 'LcRL28.fna'  | Lactobacillus kefiranofaciens ATCC 43761          | 28.2       | [24.8 - 31.8] | 23.5       | [21.2 - 26.0] | 26.1       | [23.2 - 29.2] | 0.09             |
| 'LcRL21.fna'  | Lactobacillus kefiranofaciens ATCC 43761          | 26.3       | [22.9 - 29.9] | 23.5       | [21.2 - 25.9] | 24.6       | [21.7 - 27.7] | 0.01             |
| 'LcRL13.fna'  | Lactobacillus kefiranofaciens ATCC 43761          | 28.2       | [24.9 - 31.8] | 23.5       | [21.2 - 26.0] | 26.1       | [23.2 - 29.2] | 0.06             |
| 'LcRL19.fna'  | Lactobacillus kefiranofaciens ATCC 43761          | 27.8       | [24.5 - 31.5] | 23.5       | [21.2 - 25.9] | 25.8       | [22.9 - 28.9] | 0.47             |
| 'LcRL13.fna'  | Lactobacillus ultunensis DSM 16047                | 28.4       | [25.0 - 32.0] | 23.5       | [21.2 - 25.9] | 26.2       | [23.3 - 29.3] | 1.23             |
| Query          | Subject                                      | $d_0$ | C.I. $d_0$ | $d_4$ | C.I. $d_4$ | $d_5$ | C.I. $d_5$ | Diff. G+C Percent |
|---------------|----------------------------------------------|-------|------------|-------|------------|-------|------------|------------------|
| 'LcRL31.fna'  | Lactobacillus kefiranofaciens ATCC 43761     | 27.6  | [24.3 - 31.3] | 23.4  | [21.1 - 25.9] | 25.6  | [22.8 - 28.7] | 0.05             |
| 'LcRL28.fna'  | Lactobacillus ultunensis DSM 16047           | 28.3  | [25.0 - 32.0] | 23.4  | [21.1 - 25.9] | 26.2  | [23.3 - 29.3] | 1.37             |
| 'LcRL32.fna'  | Lactobacillus kefiranofaciens ATCC 43761     | 27.7  | [24.4 - 31.4] | 23.4  | [21.1 - 25.9] | 25.7  | [22.8 - 28.8] | 0.09             |
| 'LcRL26.fna'  | Lactobacillus kefiranofaciens subsp. kefirgranum JCM 8572 | 28.2  | [24.9 - 31.9] | 23.4  | [21.1 - 25.9] | 26.1  | [23.2 - 29.2] | 0.03             |
| 'LcRL24.fna'  | Lactobacillus kefiranofaciens ATCC 43761     | 27.2  | [23.9 - 30.8] | 23.4  | [21.1 - 25.9] | 25.3  | [22.4 - 28.4] | 0.45             |
| 'LcRL20.fna'  | Lactobacillus kefiranofaciens ATCC 43761     | 27.1  | [23.7 - 30.7] | 23.4  | [21.1 - 25.9] | 25.2  | [22.3 - 28.3] | 0.65             |
| 'LcRL33.fna'  | Lactobacillus kefiranofaciens subsp. kefirgranum JCM 8572 | 27.7  | [24.3 - 31.3] | 23.4  | [21.1 - 25.8] | 25.7  | [22.8 - 28.8] | 0.48             |
| 'LcRL28.fna'  | Lactobacillus kefiranofaciens subsp. kefirgranum JCM 8572 | 28.5  | [25.1 - 32.1] | 23.4  | [21.1 - 25.8] | 26.3  | [23.4 - 29.4] | 0.12             |
| 'LcRL29.fna'  | Lactobacillus kefiranofaciens subsp. kefirgranum JCM 8572 | 28.7  | [25.3 - 32.3] | 23.4  | [21.1 - 25.8] | 26.4  | [23.5 - 29.5] | 0.25             |
| 'LcRL30.fna'  | Lactobacillus kefiranofaciens ATCC 43761     | 27.8  | [24.4 - 31.4] | 23.4  | [21.1 - 25.8] | 25.7  | [22.9 - 28.8] | 0.24             |
| 'LcRL11.fna'  | Lactobacillus kefiranofaciens subsp. kefirgranum JCM 8572 | 28.5  | [25.1 - 32.1] | 23.4  | [21.1 - 25.9] | 26.3  | [23.4 - 29.4] | 0.46             |
| 'LcRL13.fna'  | Lactobacillus kefiranofaciens subsp. kefirgranum JCM 8572 | 28.7  | [25.3 - 32.3] | 23.4  | [21.1 - 25.9] | 26.4  | [23.5 - 29.5] | 0.26             |
| 'LcRL16.fna'  | Lactobacillus kefiranofaciens subsp. kefirgranum JCM 8572 | 26.6  | [23.3 - 30.3] | 23.4  | [21.1 - 25.8] | 24.9  | [22.0 - 28.0] | 0.81             |
| 'LcRL33.fna'  | Lactobacillus ultunensis DSM 16047           | 27.9  | [24.5 - 31.5] | 23.4  | [21.1 - 25.8] | 25.8  | [22.9 - 28.9] | 1.01             |
| 'LcRL27.fna'  | Lactobacillus kefiranofaciens subsp. kefirgranum JCM 8572 | 26.4  | [23.0 - 30.0] | 23.4  | [21.1 - 25.8] | 24.7  | [21.8 - 27.8] | 0.11             |
| 'LcRL14.fna'  | Lactobacillus kefiranofaciens ATCC 43761     | 26.3  | [23.0 - 30.0] | 23.4  | [21.1 - 25.9] | 24.6  | [21.8 - 27.7] | 0.39             |
| 'LcRL20.fna'  | Lactobacillus acidophilus NBRC 13951         | 27.5  | [24.2 - 31.2] | 23.3  | [21.0 - 25.7] | 25.5  | [22.6 - 28.6] | 1.97             |
| 'LcRL31.fna'  | Lactobacillus kefiranofaciens subsp. kefirgranum JCM 8572 | 27.8  | [24.5 - 31.5] | 23.3  | [21.0 - 25.8] | 25.8  | [22.9 - 28.9] | 0.16             |
| 'LcRL24.fna'  | Lactobacillus ultunensis DSM 16047           | 27.9  | [24.6 - 31.6] | 23.3  | [21.0 - 25.7] | 25.8  | [23.0 - 28.9] | 0.84             |
| 'LcRL32.fna'  | Lactobacillus ultunensis DSM 16047           | 28.5  | [25.1 - 32.1] | 23.3  | [21.0 - 25.8] | 26.2  | [23.3 - 29.3] | 1.37             |
| 'LcRL26.fna'  | Lactobacillus acidophilus NBRC 13951         | 28.4  | [25.0 - 32.0] | 23.3  | [21.0 - 25.7] | 26.2  | [23.3 - 29.3] | 2.85             |
| 'LcRL16.fna'  | Lactobacillus ultunensis DSM 16047           | 26.8  | [23.5 - 30.5] | 23.3  | [21.0 - 25.8] | 25.0  | [22.1 - 28.1] | 0.68             |
| 'LcRL26.fna'  | Lactobacillus ultunensis DSM 16047           | 28.7  | [25.3 - 32.3] | 23.3  | [21.1 - 25.8] | 26.4  | [23.5 - 29.5] | 1.52             |
| Query         | Subject                                           | $d_0$  | C.I. $d_0$ | $d_4$  | C.I. $d_4$ | $d_5$  | C.I. $d_5$ | Diff. G+C Percent |
|--------------|---------------------------------------------------|--------|------------|--------|------------|--------|------------|------------------|
| 'LcRL13.fna' | *Lactobacillus acidophilus* NBRC 13951            | 28.8   | [25.4 - 32.4] | 23.3   | [21.0 - 25.7] | 26.5   | [23.6 - 29.6] | 2.56             |
| 'LcRL17.fna' | *Lactobacillus kefiranofaciens* ATCC 43761        | 27.1   | [23.7 - 30.7] | 23.3   | [21.0 - 25.8] | 25.2   | [22.3 - 28.3] | 1.19             |
| 'LcRL24.fna' | *Lactobacillus kefiranofaciens* subsp. kefiranum JCM 8572 | 27.5   | [24.1 - 31.1] | 23.3   | [21.0 - 25.8] | 25.5   | [22.6 - 28.6] | 0.65             |
| 'LcRL14.fna' | *Lactobacillus ultunensis* DSM 16047              | 27.0   | [23.6 - 30.6] | 23.3   | [21.0 - 25.8] | 25.1   | [22.2 - 28.2] | 0.89             |
| 'LcRL19.fna' | *Lactobacillus ultunensis* DSM 16047              | 28.4   | [25.1 - 32.1] | 23.3   | [21.0 - 25.8] | 26.2   | [23.3 - 29.3] | 1.76             |
| 'LcRL21.fna' | *Lactobacillus ultunensis* DSM 16047              | 26.9   | [23.6 - 30.6] | 23.3   | [21.0 - 25.7] | 25.1   | [22.2 - 28.2] | 1.29             |
| 'LcRL27.fna' | *Lactobacillus ultunensis* DSM 16047              | 26.8   | [23.5 - 30.5] | 23.3   | [21.0 - 25.8] | 25.0   | [22.2 - 28.1] | 1.38             |
| 'LcRL30.fna' | *Lactobacillus kefiranofaciens* subsp. kefiranum JCM 8572 | 28.0   | [24.7 - 31.7] | 23.3   | [21.0 - 25.7] | 25.9   | [23.0 - 29.0] | 0.45             |
| 'LcRL20.fna' | *Lactobacillus kefiranofaciens* subsp. kefiranum JCM 8572 | 27.3   | [23.9 - 30.9] | 23.3   | [21.0 - 25.8] | 25.3   | [22.5 - 28.4] | 0.86             |
| 'LcRL21.fna' | *Lactobacillus kefiranofaciens* subsp. kefiranum JCM 8572 | 26.5   | [23.1 - 30.1] | 23.3   | [21.0 - 25.7] | 24.7   | [21.9 - 27.8] | 0.2              |
| 'LcRL28.fna' | *Lactobacillus acidophilus* NBRC 13951            | 28.8   | [25.5 - 32.5] | 23.3   | [21.0 - 25.7] | 26.5   | [23.6 - 29.6] | 2.71             |
| 'LcRL23.fna' | *Lactobacillus kefiranofaciens* ATCC 43761        | 27.5   | [24.2 - 31.2] | 23.3   | [21.0 - 25.8] | 25.5   | [22.7 - 28.6] | 0.34             |
| 'LcRL15.fna' | *Lactobacillus kefiranofaciens* ATCC 43761        | 27.8   | [24.4 - 31.4] | 23.3   | [21.0 - 25.8] | 25.7   | [22.9 - 28.8] | 0.01             |
| 'LcRL32.fna' | *Lactobacillus kefiranofaciens* subsp. kefiranum JCM 8572 | 28.0   | [24.6 - 31.6] | 23.3   | [21.0 - 25.8] | 25.9   | [23.0 - 29.0] | 0.12             |
| 'LcRL31.fna' | *Lactobacillus ultunensis* DSM 16047              | 28.1   | [24.8 - 31.7] | 23.3   | [21.0 - 25.7] | 26.0   | [23.1 - 29.1] | 1.33             |
| 'LcRL11.fna' | *Lactobacillus acidophilus* NBRC 13951            | 28.9   | [25.5 - 32.5] | 23.3   | [21.0 - 25.7] | 26.5   | [23.7 - 29.7] | 2.37             |
| 'LcRL14.fna' | *Lactobacillus kefiranofaciens* subsp. kefiranum JCM 8572 | 26.6   | [23.3 - 30.3] | 23.3   | [21.0 - 25.8] | 24.8   | [22.0 - 27.9] | 0.6              |
| 'LcRL19.fna' | *Lactobacillus kefiranofaciens* subsp. kefiranum JCM 8572 | 28.1   | [24.7 - 31.7] | 23.3   | [21.0 - 25.8] | 25.9   | [23.1 - 29.1] | 0.27             |
| 'LcRL25.fna' | *Lactobacillus kefiranofaciens* ATCC 43761        | 27.7   | [24.3 - 31.3] | 23.3   | [21.0 - 25.8] | 25.7   | [22.8 - 28.8] | 0.27             |
| 'LcRL20.fna' | *Lactobacillus ultunensis* DSM 16047              | 27.5   | [24.1 - 31.1] | 23.3   | [21.0 - 25.8] | 25.5   | [22.6 - 28.6] | 0.63             |
| 'LcRL14.fna' | *Lactobacillus acidophilus* NBRC 13951            | 26.6   | [23.2 - 30.2] | 23.2   | [20.9 - 25.7] | 24.8   | [21.9 - 27.9] | 2.23             |
| 'LcRL25.fna' | *Lactobacillus kefiranofaciens* subsp. kefiranum JCM 8572 | 28.0   | [24.7 - 31.7] | 23.2   | [20.9 - 25.7] | 25.9   | [23.0 - 29.0] | 0.48             |
| 'LcRL21.fna' | *Lactobacillus acidophilus* NBRC 13951            | 26.9   | [23.5 - 30.8] | 23.2   | [20.9 - 25.7] | 25.0   | [22.2 - 28.1] | 2.63             |
| Query      | Subject                                      | $d_0$ | C.I. $d_0$ | $d_4$ | C.I. $d_4$ | $d_5$ | C.I. $d_5$ | Diff. G+C Percent |
|------------|----------------------------------------------|-------|------------|-------|------------|-------|------------|------------------|
| LcRL19.fna | Lactobacillus acidophilus NBRC 13951         | 28.4  | [25.1 - 32.0] | 23.2  | [20.9 - 25.7] | 26.2  | [23.3 - 29.3] | 3.09             |
| LcRL30.fna | Lactobacillus ultunensis DSM 16047           | 28.4  | [25.1 - 32.1] | 23.2  | [20.9 - 25.7] | 26.2  | [23.3 - 29.3] | 1.04             |
| LcRL25.fna | Lactobacillus acidophilus NBRC 13951         | 28.3  | [25.0 - 31.9] | 23.2  | [20.9 - 25.7] | 26.1  | [23.2 - 29.3] | 2.35             |
| LcRL15.fna | Lactobacillus acidophilus NBRC 13951         | 28.1  | [24.7 - 31.7] | 23.2  | [20.9 - 25.7] | 25.9  | [23.1 - 29.0] | 2.63             |
| LcRL33.fna | Lactobacillus acidophilus DSM 16047          | 28.5  | [25.1 - 32.1] | 23.2  | [20.9 - 25.7] | 26.2  | [23.4 - 29.4] | 0.94             |
| LcRL17.fna | Lactobacillus kefiranofaciens subsp. kefirgranum JCM 8572 | 27.4  | [24.1 - 31.1] | 23.2  | [20.9 - 25.7] | 25.4  | [22.6 - 28.5] | 0.98             |
| LcRL31.fna | Lactobacillus acidophilus NBRC 13951         | 28.2  | [24.8 - 31.8] | 23.2  | [20.9 - 25.6] | 26.0  | [23.1 - 29.1] | 2.66             |
| LcRL24.fna | Lactobacillus acidophilus NBRC 13951         | 27.9  | [24.5 - 31.5] | 23.2  | [21.0 - 25.7] | 25.8  | [22.9 - 28.9] | 2.17             |
| LcRL33.fna | Lactobacillus acidophilus NBRC 13951         | 28.0  | [24.6 - 31.6] | 23.2  | [20.9 - 25.7] | 25.8  | [23.0 - 28.9] | 2.34             |
| LcRL25.fna | Lactobacillus ultunensis DSM 16047           | 28.2  | [24.8 - 31.8] | 23.2  | [21.0 - 25.7] | 26.0  | [23.1 - 29.1] | 1.01             |
| LcRL29.fna | Lactobacillus acidophilus NBRC 13951         | 28.8  | [25.4 - 32.4] | 23.2  | [20.9 - 25.7] | 26.5  | [23.6 - 29.6] | 2.58             |
| LcRL27.fna | Lactobacillus acidophilus NBRC 13951         | 26.7  | [23.3 - 30.3] | 23.2  | [20.9 - 25.7] | 24.9  | [22.0 - 28.0] | 2.71             |
| LcRL32.fna | Lactobacillus acidophilus NBRC 13951         | 28.3  | [24.9 - 31.9] | 23.2  | [20.9 - 25.6] | 26.1  | [23.2 - 29.2] | 2.71             |
| LcRL23.fna | Lactobacillus kefiranofaciens subsp. kefirgranum JCM 8572 | 27.9  | [24.5 - 31.5] | 23.2  | [20.9 - 25.7] | 25.8  | [22.9 - 28.9] | 0.55             |
| LcRL17.fna | Lactobacillus ultunensis DSM 16047           | 27.5  | [24.2 - 31.2] | 23.2  | [20.9 - 25.7] | 25.5  | [22.7 - 28.6] | 2.47             |
| LcRL33.fna | Lactobacillus acidophilus NBRC 13951         | 28.5  | [25.2 - 32.1] | 23.2  | [20.9 - 25.6] | 26.2  | [23.4 - 29.4] | 2.28             |
| LcRL30.fna | Lactobacillus acidophilus NBRC 13951         | 28.1  | [24.8 - 31.8] | 23.2  | [20.9 - 25.7] | 26.0  | [23.1 - 29.1] | 2.38             |
| LcRL16.fna | Lactobacillus acidophilus NBRC 13951         | 26.5  | [23.2 - 30.1] | 23.2  | [20.9 - 25.7] | 24.7  | [21.9 - 27.8] | 2.02             |
| LcRL17.fna | Lactobacillus acidophilus NBRC 13951         | 27.3  | [23.9 - 30.9] | 23.2  | [20.9 - 25.7] | 25.3  | [22.5 - 28.4] | 3.81             |
| LcRL15.fna | Lactobacillus kefiranofaciens subsp. kefirgranum JCM 8572 | 28.1  | [24.8 - 31.7] | 23.2  | [20.9 - 25.7] | 26.0  | [23.1 - 29.1] | 0.2              |
| LcRL15.fna | Lactobacillus ultunensis DSM 16047           | 28.4  | [25.0 - 32.0] | 23.2  | [20.9 - 25.7] | 26.2  | [23.3 - 29.3] | 1.29             |
Table 4: Strains in your dataset

Joint dataset of automatically determined closest type strains (if this mode was chosen), manually selected type strains (if selected accordingly) and the provided user strains, if provided (marked in yellow).

| Strain                          | Authority                  | Other deposits                                                                 | Synonyms                                                                                     | Base pairs | Percent G+C | No. proteins | Goldstamp    | Bioproject accession | Biosample accession | Assembly accession | IMG OID            |
|---------------------------------|----------------------------|--------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|------------|-------------|--------------|--------------|---------------------|---------------------|--------------------|--------------------|
| Lactobacillus suntoryeus LMG 22464 | Cachat and Priest 2005    | NCIMB 14005; SA                                                                  | Lactobacillus suntoryeus                                                                       | 1760       | 36.5        | 1825         | Gp0131240    | PRJNA224116         | SAMN02797793        | GCF_001437535      |                    |
| Lactobacillus kefiranofaciens ATCC 43761 | Fujisawa et al. 1988 emend. Vancanneyt et al. 2004 | LMG 19149; CCUG 32248; DSM 3016; JCM 6985; CIP 103307; strain WT-2B | Lactobacillus kefiranofaciens; Lactobacillus kefiranofaciens subsp. kefiranofaciens            | 2281       | 37.2        | 2367         | Gp0099413    | PRJNA257853         | SAMN02983011        | GCA_900103655      | 2597490363         |
| Lactobacillus helveticus DSM 20075 | (Orla-Jensen 1919) Bergey et al. 1925 | LMG 13555; LMG 6413; NRRL B-4526; CCUG 30139; ATCC 15009; JCM 1120;IFO 15019; NBRC 15019; CIP 103146 | Lactobacillus helveticus, Thermobacterium helveticum                                           | 1804       | 36.8        | 2078         | Gp0003635    | PRJNA34619          | SAMN00139430        | GCA_000160855      | 645951865           |
| Lactobacillus ultunensis DSM 16047 | Roos et al. 2005           | LMG 22117; CCUG 48460; JCM 16177; Kr146C1                                         | Lactobacillus ultunensis                                                                        | 2159       | 35.9        | 2210         | Gp0003665    | PRJNA31505          | SAMN00001484        | GCA_000159415      | 643886047           |
| Strain                                      | Authority                                      | Other deposits                                             | Synonyms                                      | Base pairs | Percent G+C | No. proteins | Goldstamp     | Bioproject accession | Biosample accession | Assembly accession | IMG OID         |
|---------------------------------------------|-----------------------------------------------|------------------------------------------------------------|-----------------------------------------------|------------|-------------|--------------|---------------|----------------------|--------------------|---------------------|------------------|
| Lactobacillus acidophilus                  | Moro 1900 Hansen and Mocquot 1970             | LMG 13550; LMG 9433; BCRC 10695; NRRL B-4495; CCUG 5917; DSM 20079; ATCC 4355; NCTC 12980; JCM 1132; IFO 13951; VKM B-1660; CIP 76.13 | Bacillus acidophilus; Lactobacillus acidophilus | 1955       | 34.6        | 1873         | Gp0075770     | PRJDB1353           | SAMD00046914       | GCA_001591845      |
| Lactobacillus kitasatonis                  | Mukai et al. 2003                             | KCTC 3155; DSM 16761                                      | Lactobacillus kitasatonis                     | 1902       | 37.5        | 2050         | Gp0026726     | PRJDB640            | SAMD00016339       | GCA_000615285      | 2565956592        |
| Lactobacillus gallinarum                   | Fujisawa et al. 1992                         | LMG 9435; CCUG 30724; DSM 10532; ATCC 33199; CIP 103611; VPI 1294 | Lactobacillus gallinarum                     | 1918       | 36.5        | 2076         | Gp0091989     | PRJDB621            | SAMD00003603       | GCA_000614735      |
| Lactobacillus kefiranofaciens subsp. kefirgranum | (Takizawa et al. 1994) Vancanneyt et al. 2004 | LMG 15132; CCUG 39467; CCUG 49353; DSM 10550; ATCC 51647; CIP 104241; GCL 1701 | Lactobacillus kefiranofaciens subsp. kefirgranum; Lactobacillus kefirgranum | 2065       | 37.4        | 2918         | Gp0093297     | PRJDB772            | SAMD00000473       | GCA_001311335      |
| Lactobacillus crispatus                    | (Brygoo and Aladame 1953) Moore and Holdeman 1970 emend. Cato et al. 1983 | LMG 9479; CCUG 30722; DSM 20584; ATCC 33820; CIP 102990; CIP 3199 | Eubacterium crispatum; Lactobacillus crispatus | 2033       | 36.6        | 3305         | Gp0093095     | PRJDB800            | SAMD00000420       | GCA_001311685      |
| Strain                        | Authority          | Other deposits                          | Synonyms                  | Base pairs | Percent G+C | No. proteins | Goldstamp   | Bioproject accession | Biosample accession | Assembly accession | IMG OID        |
|------------------------------|--------------------|----------------------------------------|---------------------------|------------|-------------|--------------|-------------|----------------------|---------------------|-------------------|---------------|
| *Lactobacillus amylovorus* DSM 20531 | Nakamura 1981     | LMG 9496; NRRL B-4540; CCUG 27201; ATCC 33620; JCM 1126; CIP 102989; NCAIM B.01458 | *Lactobacillus amylovorus* | 2016       | 37.8        | 2045         | Gp0130192   | PRJNA224116          | SAMN02369422       | GCF_001433985 |
| *Lactobacillus sobrius* DSM 16698    | Konstantinov et al. 2006 | 1; NCCB 100067; OTU171-001 | *Lactobacillus sobrius* | 1992       | 37.8        | 1950         | Gp0131222   | PRJNA224116          | SAMN02797775       | GCF_001437365 |
| LcRL11.fna                    |                    |                                        |                           | 2184       | 37.0        | 2409         |             |                      |                     |                  |
| LcRL13.fna                    |                    |                                        |                           | 2245       | 37.2        | 2560         |             |                      |                     |                  |
| LcRL14.fna                    |                    |                                        |                           | 2607       | 36.8        | 2971         |             |                      |                     |                  |
| LcRL15.fna                    |                    |                                        |                           | 2327       | 37.2        | 2634         |             |                      |                     |                  |
| LcRL16.fna                    |                    |                                        |                           | 2597       | 36.6        | 2918         |             |                      |                     |                  |
| LcRL17.fna                    |                    |                                        |                           | 2462       | 38.4        | 2961         |             |                      |                     |                  |
| LcRL19.fna                    |                    |                                        |                           | 2310       | 37.7        | 2668         |             |                      |                     |                  |
| LcRL20.fna                    |                    |                                        |                           | 2439       | 36.6        | 2736         |             |                      |                     |                  |
| LcRL21.fna                    |                    |                                        |                           | 2569       | 37.2        | 2953         |             |                      |                     |                  |
| LcRL23.fna                    |                    |                                        |                           | 2327       | 36.9        | 2558         |             |                      |                     |                  |
| LcRL24.fna                    |                    |                                        |                           | 2392       | 36.8        | 2631         |             |                      |                     |                  |
| LcRL25.fna                    |                    |                                        |                           | 2350       | 36.9        | 2594         |             |                      |                     |                  |
| Strain    | Author  | Other deposits | Synonyms | Base pairs | Percent G+C | No. proteins | Goldstamp | Bioproject accession | Biosample accession | Assembly accession | IMG OID |
|-----------|---------|----------------|----------|------------|-------------|--------------|------------|----------------------|---------------------|-------------------|--------|
| LcRL26.fna |         |                |          | 2274027    | 37.4        | 2638         |            |                      |                     |                   |        |
| LcRL27.fna |         |                |          | 2602691    | 37.3        | 3030         |            |                      |                     |                   |        |
| LcRL28.fna |         |                |          | 2240036    | 37.3        | 2550         |            |                      |                     |                   |        |
| LcRL29.fna |         |                |          | 2248310    | 37.2        | 2559         |            |                      |                     |                   |        |
| LcRL30.fna |         |                |          | 2322358    | 37.0        | 2654         |            |                      |                     |                   |        |
| LcRL31.fna |         |                |          | 2396657    | 37.3        | 2826         |            |                      |                     |                   |        |
| LcRL32.fna |         |                |          | 2373341    | 37.3        | 2770         |            |                      |                     |                   |        |
| LcRL33.fna |         |                |          | 2401588    | 36.9        | 2771         |            |                      |                     |                   |        |
Methods, Results and References

The genome sequence data were uploaded to the Type (Strain) Genome Server (TYGS), a free bioinformatics platform available under https://tygs.dsmz.de, for a whole genome-based taxonomic analysis [1]. The results were provided by the TYGS on 2020-05-25. In brief, the TYGS analysis was subdivided into the following steps:

Determination of closely related type strains

Determination of closest type strain genomes was done in two complementary ways: First, all user genomes were compared against all type strain genomes available in the TYGS database via the MASH algorithm, a fast approximation of intergenomic relatedness [2], and, the ten type strains with the smallest MASH distances chosen per user genome. Second, an additional set of ten closely related type strains was determined via the 16S rDNA gene sequences. These were extracted from the user genomes using RNAmmer [3] and each sequence was subsequently BLASTed [4] against the 16S rDNA gene sequence of each of the currently 11767 type strains available in the TYGS database. This was used as a proxy to find the best 50 matching type strains (according to the bitscore) for each user genome and to subsequently calculate precise distances using the Genome BLAST Distance Phylogeny approach (GBDP) under the algorithm 'coverage' and distance formula \( d \) [5]. These distances were finally used to determine the 10 closest type strain genomes for each of the user genomes.

Pairwise comparison of genome sequences

All pairwise comparisons among the set of genomes were conducted using GBDP and accurate intergenomic distances inferred under the algorithm 'trimming' and distance formula \( d \) [5]. 100 distance replicates were calculated each. Digital DDH values and confidence intervals were calculated using the recommended settings of the GGDC 2.1 [5].

Phylogenetic inference

The resulting intergenomic distances were used to infer a balanced minimum evolution tree with branch support via FASTME 2.1.4 including SPR postprocessing [6]. Branch support was inferred from 100 pseudo-bootstrap replicates each. The trees were rooted at the midpoint [7] and visualized with PhyD3 [8].

Type-based species and subspecies clustering

The type-based species clustering using a 70% dDDH radius around each of the 11 type strains was done as previously described [1]. The resulting groups are shown in Table 1 and 4. Subspecies clustering was done using a 79% dDDH threshold as previously introduced [9].

Results

Type-based species and subspecies clustering

The resulting species and subspecies clusters are listed in Table 4, whereas the taxonomic identification of the query strains is found in Table 1. Briefly, the clustering yielded 8 species clusters and the provided query strains were assigned to 1 of these. Moreover, user strains were located in 1 of 10 subspecies clusters.

Figure caption genome tree

Figure 1. Tree inferred with FastME 2.1.6.1 [6] from GBDP distances calculated from genome sequences. The branch lengths are scaled in terms of GBDP distance formula \( d \). The numbers above branches are GBDP pseudo-bootstrap support values > 60 % from 100 replications, with an average branch support of 38.1 %. The tree was rooted at the midpoint [7].

Figure caption SSU tree

Figure 2. Tree inferred with FastME 2.1.6.1 [6] from GBDP distances calculated from 16S rDNA gene sequences. The branch lengths are scaled in terms of GBDP distance formula \( d \). The numbers above branches are GBDP pseudo-bootstrap support values > 60 % from 100 replications, with an average branch support of 37.8 %. The tree was rooted at the midpoint [7].
[1] Meier-Kolthoff JP, Göker M. TYGS is an automated high-throughput platform for state-of-the-art genome-based taxonomy. Nat. Commun. 2019;10: 2182. DOI: 10.1038/s41467-019-10210-3

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[8] Kreft L, Botzki A, Coppens F, Vandepoele K, Van Bel M. PhyD3: A phylogenetic tree viewer with extended phyloXML support for functional genomics data visualization. Bioinformatics. 2017;33: 2946–2947. DOI: 10.1093/bioinformatics/btx324

[9] Meier-Kolthoff JP, Hahnke RL, Petersen J, Scheuner C, Michael V, Fiebig A, et al. Complete genome sequence of DSM 30083\textsuperscript{T}, the type strain (U5/41\textsuperscript{T}) of \textit{Escherichia coli}, and a proposal for delineating subspecies in microbial taxonomy. Stand Genomic Sci. 2014;9: 2. DOI: 10.1186/1944-3277-9-2
Table 1: Phylogenies

Publication-ready versions of both the genome-scale GBDP tree and the 16S rRNA gene sequence tree can be customized and exported either in SVG (vector graphic) or PNG format from within the phylogeny viewers in your TYGS result page. For publications the SVG format is recommended because it is lossless, always keeps its high resolution and can also be easily converted to other popular formats such as PDF or EPS. Please follow the link provided above!

Table 2: Identification

The below list contains the result of the TYGS species identification routine.

Explanation of remarks that might occur in the below table:

**Remark [R1]:** The TYGS type strain database is automatically updated on an almost daily basis. However, if a particular type strain genome is not available in the TYGS database, this can have several reasons which are detailed in the FAQ. You can request an extended 16S rRNA gene analysis via the 16S tree viewer found in your result page to detect not yet genome-sequenced type strains relevant for your study.

**Remark [R2]:** > 70% dDDH value (formula \(d_4\)) and (almost) minimal dDDH values for gene-content formulae \(d_0\) and \(d_6\) indicate a potentially unreliable identification result and should thus be checked via the 16S rRNA gene sequence similarity. Such strong deviations can, in principle, be caused by sequence contamination.

**Remark [R3]:** G+C content difference of > 1% indicates a potentially unreliable identification result because within species G+C content varies no more than 1%, if computed from genome sequences (PMID: 24505073).

| Strain      | Conclusion | Identification result | Remark                                      |
|-------------|------------|-----------------------|---------------------------------------------|
| 'LcSJ3CUS'  | belongs to known species | Lactobacillus crispatus |                                             |
| 'LcV4'      | belongs to known species | Lactobacillus crispatus |                                             |
| 'LcVMC1'    | belongs to known species | Lactobacillus crispatus |                                             |
| 'LcVMC2'    | belongs to known species | Lactobacillus crispatus |                                             |
| 'LcVMC3'    | belongs to known species | Lactobacillus crispatus |                                             |
| 'LcVMC4'    | belongs to known species | Lactobacillus crispatus |                                             |
| 'LcVMC5'    | belongs to known species | Lactobacillus crispatus |                                             |
| 'LcVMC6'    | belongs to known species | Lactobacillus crispatus |                                             |
| 'LcVMC7'    | belongs to known species | Lactobacillus crispatus |                                             |
| 'LcVMC8'    | belongs to known species | Lactobacillus crispatus |                                             |
The following table contains the pairwise dDDH values between your user genomes and the selected type-strain genomes. The dDDH values are provided along with their confidence intervals (C.I.) for the three different GBDP formulas:

- formula $d_0$ (a.k.a. GGDC formula 1): length of all HSPs divided by total genome length
- formula $d_4$ (a.k.a. GGDC formula 2): sum of all identities found in HSPs divided by overall HSP length
- formula $d_6$ (a.k.a. GGDC formula 3): sum of all identities found in HSPs divided by total genome length

Note: Formula $d_4$ is independent of genome length and is thus robust against the use of incomplete draft genomes. For other reasons for preferring formula $d_4$, see the FAQ.

| Query       | Subject       | $d_0$ | C.I. ($d_0$) | $d_4$ | C.I. ($d_4$) | $d_6$ | C.I. ($d_6$) | Diff. G+C Percent |
|-------------|---------------|-------|--------------|-------|--------------|-------|--------------|-------------------|
| 'LcSJ3CUS.fna' | 'LcV4.fna'   | 91.5  | [88.5 - 93.8] | 97.8  | [96.9 - 98.5] | 94.7  | [92.7 - 96.2] | 0.27              |
| 'LcSJ3CUS.fna' | 'LcVMC1.fna' | 95.5  | [93.3 - 97.0] | 97.4  | [96.4 - 98.2] | 97.3  | [96.0 - 98.2] | 0.05              |
| 'LcV4.fna'   | 'LcVMC1.fna' | 87.3  | [83.7 - 90.1] | 96.9  | [95.7 - 97.8] | 91.5  | [88.9 - 93.5] | 0.22              |
| 'LcVMC1.fna' | 'LcVMC5.fna' | 91.7  | [88.7 - 93.9] | 96.8  | [95.7 - 97.7] | 94.7  | [92.7 - 96.2] | 0.1               |
| 'LcSJ3CUS.fna' | 'LcVMC8.fna' | 84.6  | [80.9 - 87.8] | 96.2  | [94.9 - 97.2] | 89.4  | [86.5 - 91.6] | 0.08              |
| 'LcSJ3CUS.fna' | 'LcVMC5.fna' | 91.8  | [88.8 - 94.0] | 96.2  | [94.8 - 97.2] | 94.7  | [92.7 - 96.2] | 0.16              |
| 'LcSJ3CUS.fna' | 'LcVMC2.fna' | 90.5  | [87.4 - 93.0] | 96.1  | [94.7 - 97.1] | 93.8  | [91.6 - 95.4] | 0.13              |
| 'LcV4.fna'   | 'LcVMC2.fna' | 87.6  | [84.1 - 90.5] | 95.8  | [93.4 - 96.0] | 91.6  | [89.1 - 93.6] | 0.14              |
| 'LcSJ3CUS.fna' | 'LcVMC6.fna' | 87.1  | [83.5 - 89.9] | 95.5  | [94.0 - 96.6] | 91.1  | [88.5 - 93.2] | 0.04              |
| 'LcV4.fna'   | 'LcVMC8.fna' | 80.5  | [76.6 - 83.9] | 95.4  | [93.9 - 96.6] | 85.9  | [82.8 - 88.5] | 0.19              |
| 'LcVMC1.fna' | 'LcVMC8.fna' | 82.9  | [79.1 - 86.2] | 95.3  | [93.8 - 96.5] | 87.8  | [84.8 - 90.3] | 0.03              |
| 'LcVMC1.fna' | 'LcVMC6.fna' | 86.4  | [82.8 - 89.4] | 95.1  | [93.6 - 96.3] | 90.6  | [87.9 - 92.7] | 0.01              |
| 'LcV4.fna'   | 'LcVMC6.fna' | 82.2  | [78.4 - 85.5] | 94.9  | [93.3 - 96.1] | 87.2  | [84.2 - 89.7] | 0.23              |
| 'LcVMC6.fna' | 'LcVMC8.fna' | 94.2  | [91.7 - 96.0] | 94.6  | [92.9 - 95.9] | 96.1  | [94.5 - 97.5] | 0.04              |
| 'LcV4.fna'   | 'LcVMC5.fna' | 87.5  | [84.0 - 90.4] | 94.6  | [92.9 - 95.9] | 91.3  | [88.8 - 93.4] | 0.12              |
| 'LcVMC1.fna' | 'LcVMC2.fna' | 91.6  | [88.6 - 93.9] | 94.5  | [92.8 - 95.8] | 94.3  | [92.2 - 95.9] | 0.08              |
| 'LcVMC5.fna' | 'LcVMC6.fna' | 87.1  | [83.6 - 90.0] | 94.4  | [92.7 - 95.7] | 91.0  | [88.4 - 93.1] | 0.12              |
| 'LcVMC2.fna' | 'LcVMC6.fna' | 86.8  | [83.2 - 89.7] | 94.1  | [92.3 - 95.5] | 90.7  | [88.1 - 92.8] | 0.09              |
| 'LcVMC4.fna' | 'LcVMC7.fna' | 90.1  | [86.8 - 92.6] | 94.0  | [92.2 - 95.4] | 93.1  | [90.8 - 94.9] | 0.15              |
| 'LcVMC5.fna' | 'LcVMC8.fna' | 88.4  | [85.0 - 91.2] | 93.6  | [91.7 - 95.0] | 91.9  | [89.4 - 93.8] | 0.08              |
| 'LcVMC2.fna' | 'LcVMC5.fna' | 93.4  | [90.7 - 95.3] | 93.5  | [91.6 - 95.0] | 95.4  | [93.6 - 96.8] | 0.02              |
| 'LcVMC2.fna' | 'LcVMC8.fna' | 88.4  | [85.0 - 91.1] | 92.7  | [90.7 - 94.2] | 91.7  | [89.2 - 93.7] | 0.05              |
| Query          | Subject          | $d_0$   | C.I. $d_0$ | $d_4$   | C.I. $d_4$ | $d_i$   | C.I. $d_i$ | Diff. G+C Percent |
|---------------|------------------|---------|------------|---------|------------|---------|------------|------------------|
| 'LcSJ3CUS.fna' | 'LcVMC7.fna'     | 86.7    | [83.1 - 89.6] | 90.5    | [88.3 - 92.4] | 90.1    | [87.3 - 92.3] | 0.12             |
| 'LcV4.fna'    | 'LcVMC7.fna'     | 79.1    | [75.1 - 82.5] | 90.4    | [88.1 - 92.2] | 83.9    | [80.6 - 86.7] | 0.39             |
| 'LcSJ3CUS.fna' | 'LcVMC4.fna'     | 84.5    | [80.7 - 87.6] | 90.3    | [88.0 - 92.2] | 88.3    | [85.4 - 90.7] | 0.03             |
| 'LcVMC6.fna'  | 'LcVMC7.fna'     | 76.7    | [72.8 - 80.3] | 90.0    | [87.7 - 92.0] | 81.8    | [78.5 - 84.7] | 0.16             |
| 'LcVMC4.fna'  | 'LcVMC6.fna'     | 80.5    | [76.6 - 83.9] | 89.9    | [87.6 - 91.8] | 85.0    | [81.8 - 87.7] | 0.01             |
| 'LcVMC1.fna'  | 'LcVMC4.fna'     | 81.8    | [77.9 - 85.1] | 89.9    | [87.6 - 91.8] | 86.0    | [82.9 - 88.7] | 0.02             |
| 'LcVMC1.fna'  | 'LcVMC7.fna'     | 82.5    | [78.7 - 85.8] | 89.7    | [87.4 - 91.7] | 86.7    | [83.6 - 89.2] | 0.17             |
| 'LcVMC5.fna'  | 'LcVMC7.fna'     | 80.3    | [76.4 - 83.7] | 89.5    | [87.1 - 91.5] | 84.8    | [81.6 - 87.5] | 0.28             |
| 'LcVMC7.fna'  | 'LcVMC8.fna'     | 73.2    | [69.2 - 76.8] | 88.5    | [86.1 - 90.6] | 78.4    | [75.0 - 81.5] | 0.2              |
| 'LcVMC2.fna'  | 'LcVMC7.fna'     | 77.7    | [73.8 - 81.3] | 87.9    | [85.4 - 90.0] | 82.3    | [79.0 - 85.2] | 0.25             |
| 'LcV4.fna'    | 'LcVMC4.fna'     | 85.3    | [81.6 - 88.4] | 86.9    | [84.3 - 89.1] | 88.4    | [85.5 - 90.8] | 0.24             |
| 'LcVMC4.fna'  | 'LcVMC8.fna'     | 77.1    | [73.1 - 80.6] | 85.6    | [82.9 - 87.9] | 81.4    | [78.0 - 84.3] | 0.05             |
| 'LcVMC4.fna'  | 'LcVMC5.fna'     | 85.8    | [82.1 - 88.8] | 85.3    | [82.6 - 87.7] | 88.6    | [85.7 - 91.0] | 0.12             |
| 'LcVMC2.fna'  | 'LcVMC4.fna'     | 84.2    | [80.4 - 87.3] | 85.3    | [82.6 - 87.7] | 87.3    | [84.2 - 89.8] | 0.1              |
| 'LcVMC1.fna'  | 'LcVMC3.fna'     | 69.2    | [65.3 - 72.9] | 83.6    | [80.8 - 86.1] | 74.1    | [70.6 - 77.3] | 0.24             |
| 'LcVMC3.fna'  | 'LcVMC7.fna'     | 70.2    | [66.3 - 73.9] | 83.5    | [80.7 - 86.0] | 74.9    | [71.5 - 78.1] | 0.07             |
| 'LcVMC3.fna'  | 'LcVMC4.fna'     | 67.0    | [63.2 - 70.7] | 83.2    | [80.4 - 85.7] | 71.9    | [68.5 - 75.2] | 0.22             |
| 'LcV4.fna'    | 'LcVMC3.fna'     | 64.6    | [60.8 - 68.2] | 83.2    | [80.4 - 85.7] | 69.6    | [66.2 - 72.8] | 0.46             |
| 'LcVMC3.fna'  | 'LcVMC5.fna'     | 66.1    | [62.2 - 69.7] | 82.9    | [80.0 - 85.4] | 71.0    | [67.5 - 74.2] | 0.35             |
| 'LcSJ3CUS.fna' | 'LcVMC3.fna'     | 71.7    | [67.8 - 75.4] | 81.9    | [79.1 - 84.5] | 76.0    | [72.6 - 79.2] | 0.19             |
| 'LcVMC3.fna'  | 'LcVMC8.fna'     | 61.8    | [58.1 - 65.4] | 81.7    | [78.8 - 84.2] | 66.7    | [63.3 - 70.0] | 0.27             |
| 'LcVMC3.fna'  | 'LcVMC6.fna'     | 62.9    | [59.2 - 66.5] | 81.6    | [78.7 - 84.1] | 67.8    | [64.4 - 71.0] | 0.23             |
| 'LcVMC2.fna'  | 'LcVMC3.fna'     | 64.7    | [60.9 - 68.3] | 81.2    | [78.3 - 83.8] | 69.4    | [66.0 - 72.7] | 0.32             |
| 'LcVMC1.fna'  | Lactobacillus crispatus JCM 1185 | 71.9    | [67.9 - 75.5] | 77.8    | [74.8 - 80.5] | 75.5    | [72.0 - 78.6] | 0.22             |
| 'LcV4.fna'    | Lactobacillus crispatus JCM 1185 | 66.2    | [62.4 - 69.9] | 77.8    | [74.8 - 80.5] | 70.3    | [66.9 - 73.5] | 0.44             |
| 'LcSJ3CUS.fna' | Lactobacillus crispatus JCM 1185 | 73.5    | [69.5 - 77.1] | 77.3    | [74.3 - 80.0] | 76.8    | [73.4 - 80.0] | 0.17             |
| 'LcVMC5.fna'  | Lactobacillus crispatus JCM 1185 | 68.0    | [64.1 - 71.6] | 77.2    | [74.2 - 80.0] | 71.9    | [68.4 - 75.1] | 0.32             |
| Query          | Subject                                      | d₀  | C.I. d₀       | d₄  | C.I. d₄       | d₉  | C.I. d₉       | Diff G+C Percent |
|----------------|----------------------------------------------|-----|---------------|-----|---------------|-----|---------------|------------------|
| 'LcVMC2.fna'   | Lactobacillus crispatus JCM 1185             | 66.9| [63.1 - 70.6] | 76.9| [73.9 - 79.6] | 70.8| [67.4 - 74.1] | 0.3              |
| 'LcVMC6.fna'   | Lactobacillus crispatus JCM 1185             | 63.8| [60.0 - 67.4] | 76.8| [73.8 - 79.5] | 67.9| [64.5 - 71.1] | 0.21             |
| 'LcVMC8.fna'   | Lactobacillus crispatus JCM 1185             | 63.9| [60.1 - 67.5] | 76.8| [73.8 - 79.5] | 68.0| [64.6 - 71.2] | 0.25             |
| 'LcVMC4.fna'   | Lactobacillus crispatus JCM 1185             | 68.8| [64.9 - 72.4] | 75.6| [72.6 - 78.4] | 72.3| [68.8 - 75.5] | 0.2              |
| 'LcVMC7.fna'   | Lactobacillus crispatus JCM 1185             | 70.6| [66.6 - 74.2] | 75.5| [72.5 - 78.3] | 73.9| [70.4 - 77.1] | 0.05             |
| 'LcVMC3.fna'   | Lactobacillus crispatus JCM 1185             | 73.1| [69.1 - 76.7] | 75.4| [72.4 - 78.2] | 76.1| [72.7 - 79.3] | 0.02             |
| 'LcSJ3CUS.fna' | Lactobacillus gallinarum JCM 2011            | 33.0| [29.6 - 36.6] | 24.5| [22.2 - 27.0] | 29.9| [27.0 - 33.0] | 0.28             |
| 'LcVMC4.fna'   | Lactobacillus amylovorus DSM 20531            | 31.0| [27.6 - 34.6] | 24.3| [22.0 - 26.7] | 28.3| [25.4 - 31.4] | 0.99             |
| 'LcVMC4.fna'   | Lactobacillus gallinarum JCM 2011            | 31.1| [27.7 - 34.7] | 24.3| [22.0 - 26.8] | 28.4| [25.5 - 31.5] | 0.31             |
| 'LcVMC3.fna'   | Lactobacillus amylovorus DSM 20531            | 32.9| [29.5 - 36.5] | 24.3| [22.0 - 26.8] | 29.8| [26.8 - 32.9] | 1.21             |
| 'LcSJ3CUS.fna' | Lactobacillus synomial DSM 1324              | 31.2| [27.8 - 34.8] | 24.3| [21.9 - 26.7] | 28.5| [25.6 - 31.6] | 0.23             |
| 'LcVMC1.fna'   | Lactobacillus gallinarum JCM 2011            | 31.3| [27.9 - 34.9] | 24.3| [22.0 - 26.8] | 28.6| [25.7 - 31.7] | 0.33             |
| 'LcVMC7.fna'   | Lactobacillus gallinarum JCM 2011            | 31.6| [28.2 - 35.2] | 24.3| [22.0 - 26.8] | 28.8| [25.9 - 31.9] | 0.16             |
| 'LcVMC8.fna'   | Lactobacillus gallinarum JCM 2011            | 30.0| [26.7 - 33.6] | 24.3| [22.0 - 26.8] | 27.7| [24.7 - 30.8] | 0.36             |
| 'LcVMC5.fna'   | Lactobacillus gallinarum JCM 2011            | 31.0| [27.7 - 34.6] | 24.2| [21.9 - 26.7] | 28.4| [25.5 - 31.5] | 0.44             |
| 'LcVMC8.fna'   | Lactobacillus synomial DSM 1324              | 28.8| [25.4 - 32.4] | 24.2| [21.9 - 26.6] | 26.7| [23.8 - 29.8] | 0.31             |
| 'LcVMC2.fna'   | Lactobacillus gallinarum JCM 2011            | 30.5| [27.1 - 34.1] | 24.2| [21.9 - 26.6] | 28.0| [25.1 - 31.1] | 0.41             |
| 'LcV4.fna'     | Lactobacillus gallinarum JCM 2011            | 31.7| [28.3 - 35.3] | 24.2| [21.9 - 26.7] | 28.9| [26.0 - 32.0] | 0.55             |
| 'LcVMC4.fna'   | Lactobacillus kitasatoniis JCM 1039         | 31.6| [28.2 - 35.2] | 24.2| [21.9 - 26.7] | 28.8| [25.8 - 31.9] | 0.72             |
| 'LcVMC3.fna'   | Lactobacillus kitasatoniis JCM 1039         | 33.3| [29.9 - 36.8] | 24.1| [21.8 - 26.6] | 30.0| [27.0 - 33.1] | 0.94             |
| 'LcSJ3CUS.fna' | Lactobacillus amylovorus DSM 20531            | 34.0| [30.6 - 37.5] | 24.1| [21.8 - 26.6] | 30.5| [27.5 - 33.6] | 1.02             |
| 'LcVMC5.fna'   | Lactobacillus synomial DSM 1324              | 29.7| [26.3 - 33.3] | 24.1| [21.8 - 26.6] | 27.3| [24.4 - 30.4] | 0.39             |
| 'LcVMC3.fna'   | Lactobacillus gallinarum JCM 2011            | 33.2| [29.9 - 36.8] | 24.1| [21.8 - 26.5] | 29.9| [27.0 - 33.0] | 0.09             |
| 'LcVMC1.fna'   | Lactobacillus kitasatoniis JCM 1039         | 32.5| [29.1 - 36.1] | 24.1| [21.8 - 26.6] | 29.4| [26.5 - 32.5] | 0.7              |
| 'LcVMC6.fna'   | Lactobacillus gallinarum JCM 2011            | 31.3| [27.9 - 34.9] | 24.1| [21.8 - 26.6] | 28.5| [25.6 - 31.6] | 0.32             |
| 'LcVMC7.fna'   | Lactobacillus amylovorus DSM 20531            | 30.7| [27.3 - 34.3] | 24.1| [21.8 - 26.6] | 28.1| [25.2 - 31.2] | 1.14             |
| 'LcSJ3CUS.fna' | Lactobacillus sobrius DSM 16698              | 32.9| [29.6 - 36.5] | 24.0| [21.7 - 26.4] | 29.7| [26.8 - 32.8] | 1.07             |
| Query            | Subject                                      | $d_0$ | C.I. $d_0$ | $d_4$ | C.I. $d_4$ | $d_5$ | C.I. $d_5$ | Diff. G+C Percent |
|------------------|----------------------------------------------|-------|------------|-------|------------|-------|------------|-------------------|
| 'LcSJ3CUS.fna'   | Lactobacillus kitasatoris JCM 1039          | 33.2  | [29.8 - 36.7] | 24.0  | [21.7 - 26.4] | 29.9  | [26.9 - 33.0] | 0.75              |
| 'LcVMC8.fna'     | Lactobacillus amylovorus DSM 20531         | 30.8  | [27.5 - 34.4] | 24.0  | [21.7 - 26.5] | 28.2  | [25.3 - 31.3] | 0.94              |
| 'LcVMC3.fna'     | Lactobacillus helveticus DSM 20075       | 27.9  | [24.5 - 31.5] | 24.0  | [21.7 - 26.4] | 25.9  | [23.0 - 29.0] | 0.19              |
| 'LcVMC2.fna'     | Lactobacillus kitasatoris JCM 1039          | 31.9  | [28.5 - 35.5] | 24.0  | [21.7 - 26.4] | 29.0  | [26.0 - 32.1] | 0.62              |
| 'LcVMC4.fna'     | Lactobacillus suntoryeus LMG 22464         | 29.4  | [26.0 - 33.0] | 24.0  | [21.7 - 26.5] | 27.1  | [24.2 - 30.2] | 0.26              |
| 'LcVMC1.fna'     | Lactobacillus amylovorus DSM 20531         | 32.2  | [28.8 - 35.8] | 24.0  | [21.7 - 26.5] | 29.2  | [26.3 - 32.3] | 0.97              |
| 'LcVMC4.fna'     | Lactobacillus helveticus DSM 20075       | 26.7  | [23.4 - 30.3] | 24.0  | [21.7 - 26.5] | 25.0  | [22.2 - 28.1] | 0.03              |
| 'LcVMC6.fna'     | Lactobacillus suntoryeus LMG 22464         | 29.1  | [25.7 - 32.7] | 24.0  | [21.7 - 26.5] | 26.9  | [24.0 - 30.0] | 0.27              |
| 'LcVMC5.fna'     | Lactobacillus helveticus DSM 20075       | 27.0  | [23.6 - 30.6] | 24.0  | [21.7 - 26.5] | 25.2  | [22.4 - 28.4] | 0.16              |
| 'LcV4.fna'       | Lactobacillus suntoryeus LMG 22464         | 30.3  | [26.9 - 33.9] | 24.0  | [21.7 - 26.5] | 27.8  | [24.9 - 30.9] | 0.5               |
| 'LcVMC7.fna'     | Lactobacillus kitasatoris JCM 1039          | 32.6  | [29.2 - 36.2] | 24.0  | [21.7 - 26.5] | 29.5  | [26.6 - 32.6] | 0.87              |
| 'LcVMC6.fna'     | Lactobacillus amylovorus DSM 20531         | 31.1  | [27.7 - 34.7] | 24.0  | [21.7 - 26.4] | 28.3  | [25.4 - 31.4] | 0.98              |
| 'LcVMC8.fna'     | Lactobacillus helveticus DSM 20075       | 26.3  | [22.9 - 29.9] | 24.0  | [21.7 - 26.5] | 24.7  | [21.9 - 27.8] | 0.08              |
| 'LcSJ3CUS.fna'   | Lactobacillus helveticus DSM 20075       | 28.2  | [24.8 - 31.8] | 24.0  | [21.7 - 26.5] | 26.2  | [23.3 - 29.3] | 0.0               |
| 'LcVMC6.fna'     | Lactobacillus kitasatoris JCM 1039          | 31.2  | [27.8 - 34.7] | 23.9  | [21.6 - 26.4] | 28.4  | [25.5 - 31.5] | 0.71              |
| 'LcVMC3.fna'     | Lactobacillus sobrius DSM 16698          | 32.7  | [29.3 - 36.2] | 23.9  | [21.6 - 26.4] | 29.5  | [26.6 - 32.6] | 1.26              |
| 'LcVMC4.fna'     | Lactobacillus sobrius DSM 16698          | 30.7  | [27.3 - 34.3] | 23.9  | [21.6 - 26.4] | 28.1  | [25.1 - 31.2] | 1.04              |
| 'LcV4.fna'       | Lactobacillus amylovorus DSM 20531         | 33.4  | [30.1 - 37.0] | 23.9  | [21.5 - 26.3] | 30.0  | [27.1 - 33.1] | 0.75              |
| 'LcV4.fna'       | Lactobacillus kitasatoris JCM 1039          | 32.5  | [29.1 - 36.0] | 23.9  | [21.6 - 26.3] | 29.3  | [26.4 - 32.4] | 0.48              |
| 'LcVMC2.fna'     | Lactobacillus suntoryeus LMG 22464         | 29.4  | [26.0 - 33.0] | 23.9  | [21.6 - 26.4] | 27.1  | [24.2 - 30.2] | 0.36              |
| 'LcVMC2.fna'     | Lactobacillus amylovorus DSM 20531         | 31.4  | [28.0 - 34.9] | 23.9  | [21.6 - 26.4] | 28.5  | [25.6 - 31.6] | 0.89              |
| 'LcVMC7.fna'     | Lactobacillus suntoryeus LMG 22464         | 30.3  | [27.0 - 33.9] | 23.9  | [21.6 - 26.4] | 27.8  | [24.9 - 30.9] | 0.11              |
| 'LcVMC3.fna'     | Lactobacillus suntoryeus LMG 22464         | 30.7  | [27.4 - 34.3] | 23.9  | [21.6 - 26.4] | 28.1  | [25.2 - 31.2] | 0.04              |
| 'LcVMC1.fna'     | Lactobacillus suntoryeus LMG 22464         | 30.4  | [27.0 - 34.0] | 23.9  | [21.6 - 26.4] | 27.8  | [24.9 - 30.9] | 0.28              |
| 'LcVMC8.fna'     | Lactobacillus kitasatoris JCM 1039          | 30.5  | [27.1 - 34.1] | 23.9  | [21.6 - 26.3] | 27.9  | [25.0 - 31.0] | 0.67              |
| 'LcVMC5.fna'     | Lactobacillus amylovorus DSM 20531         | 31.8  | [28.5 - 35.4] | 23.9  | [21.6 - 26.4] | 28.9  | [26.0 - 32.0] | 0.86              |
| 'LcVMC7.fna'     | Lactobacillus helveticus DSM 20075         | 27.1  | [23.8 - 30.8] | 23.9  | [21.6 - 26.4] | 25.3  | [22.5 - 28.5] | 0.12              |
| Query          | Subject                                | \(d_0\) | C.I. \(d_0\) | \(d_4\) | C.I. \(d_4\) | \(d_5\) | C.I. \(d_5\) | Diff. G+C Percent |
|---------------|----------------------------------------|---------|--------------|---------|--------------|---------|--------------|-----------------|
| 'LcVMC1.fna'  | Lactobacillus sobrius DSM 16698         | 32.2    | [28.8 - 35.8]| 23.8    | [21.5 - 26.2]| 29.1    | [26.2 - 32.2]| 1.02            |
| 'LcVMC5.fna'  | Lactobacillus kitasatonis JCM 1039      | 31.7    | [28.3 - 35.3]| 23.8    | [21.5 - 26.3]| 28.7    | [25.8 - 31.8]| 0.59            |
| 'LcVMC1.fna'  | Lactobacillus helveticus DSM 20075      | 27.4    | [24.0 - 31.0]| 23.8    | [21.5 - 26.3]| 25.5    | [22.6 - 28.6]| 0.05            |
| 'LcVMC7.fna'  | Lactobacillus sobrius DSM 16698         | 30.6    | [27.3 - 34.2]| 23.8    | [21.5 - 26.2]| 28.0    | [25.1 - 31.1]| 1.19            |
| 'LcVMC6.fna'  | Lactobacillus helveticus DSM 20075      | 26.5    | [23.1 - 30.1]| 23.8    | [21.5 - 26.3]| 24.8    | [22.0 - 27.9]| 0.04            |
| 'LcVMC8.fna'  | Lactobacillus sobrius DSM 16698         | 30.6    | [27.2 - 34.2]| 23.8    | [21.5 - 26.3]| 28.0    | [25.0 - 31.1]| 0.99            |
| 'LcVMC2.fna'  | Lactobacillus helveticus DSM 20075      | 26.9    | [23.5 - 30.5]| 23.8    | [21.5 - 26.3]| 25.1    | [22.3 - 28.2]| 0.13            |
| 'LcV4.fna'    | Lactobacillus sobrius DSM 16698         | 32.1    | [28.7 - 35.6]| 23.7    | [21.4 - 26.2]| 29.0    | [26.1 - 32.1]| 0.8             |
| 'LcVMC5.fna'  | Lactobacillus sobrius DSM 16698         | 31.6    | [28.3 - 35.2]| 23.7    | [21.4 - 26.1]| 28.7    | [25.8 - 31.6]| 0.92            |
| 'LcV4.fna'    | Lactobacillus helveticus DSM 20075      | 27.5    | [24.1 - 31.1]| 23.7    | [21.4 - 26.2]| 25.6    | [22.7 - 28.7]| 0.27            |
| 'LcVMC6.fna'  | Lactobacillus sobrius DSM 16698         | 31.2    | [27.8 - 34.8]| 23.7    | [21.4 - 26.2]| 28.4    | [25.4 - 31.5]| 1.03            |
| 'LcVMC2.fna'  | Lactobacillus sobrius DSM 16698         | 31.0    | [27.6 - 34.6]| 23.7    | [21.4 - 26.2]| 28.2    | [25.3 - 31.3]| 0.94            |
| 'LcV4.fna'    | Lactobacillus acidophilus NBRC 13951    | 29.3    | [25.9 - 32.9]| 23.3    | [21.0 - 25.8]| 26.8    | [23.9 - 29.9]| 2.43            |
| 'LcVMC1.fna'  | Lactobacillus acidophilus NBRC 13951    | 29.3    | [25.9 - 32.9]| 23.3    | [21.0 - 25.7]| 26.8    | [23.9 - 29.9]| 2.21            |
| 'LcVMC4.fna'  | Lactobacillus acidophilus NBRC 13951    | 28.5    | [25.1 - 32.1]| 23.3    | [21.0 - 25.8]| 26.3    | [23.4 - 29.4]| 2.19            |
| 'LcVMC8.fna'  | Lactobacillus acidophilus NBRC 13951    | 27.6    | [24.3 - 31.3]| 23.3    | [21.0 - 25.8]| 25.6    | [22.7 - 28.7]| 2.24            |
| 'LcSJ3CUS.fna'| Lactobacillus kefirgranaci ATCC 43761   | 29.2    | [25.8 - 32.8]| 23.3    | [21.0 - 25.8]| 26.8    | [23.9 - 29.9]| 0.46            |
| 'LcVMC5.fna'  | Lactobacillus acidophilus NBRC 13951    | 28.5    | [25.1 - 32.1]| 23.3    | [21.0 - 25.7]| 26.2    | [23.3 - 29.3]| 2.32            |
| 'LcVMC2.fna'  | Lactobacillus acidophilus NBRC 13951    | 28.7    | [25.3 - 32.3]| 23.3    | [21.0 - 25.7]| 26.4    | [23.5 - 29.5]| 2.29            |
| 'LcVMC8.fna'  | Lactobacillus kefirgranaci ATCC 43761   | 27.2    | [23.8 - 30.8]| 23.2    | [21.0 - 25.7]| 25.2    | [22.4 - 28.3]| 0.38            |
| 'LcVMC8.fna'  | Lactobacillus kefirgranaci subsp. kefirgranum JCM 8572 | 27.4    | [24.0 - 31.0]| 23.2    | [20.9 - 25.7]| 25.4    | [22.5 - 28.5]| 0.59            |
| 'LcVMC7.fna'  | Lactobacillus acidophilus NBRC 13951    | 29.1    | [25.7 - 32.7]| 23.2    | [21.0 - 25.7]| 26.7    | [23.8 - 29.8]| 2.04            |
| 'LcVMC3.fna'  | Lactobacillus acidophilus NBRC 13951    | 30.9    | [27.5 - 34.5]| 23.2    | [20.9 - 25.6]| 28.0    | [25.1 - 31.1]| 1.97            |
| 'LcSJ3CUS.fna'| Lactobacillus kefirgranaci subsp. kefirgranum JCM 8572 | 29.6    | [26.2 - 33.2]| 23.2    | [20.9 - 25.7]| 27.1    | [24.2 - 30.2]| 0.67            |
| 'LcSJ3CUS.fna'| Lactobacillus acidophilus NBRC 13951    | 30.3    | [26.9 - 33.9]| 23.2    | [20.9 - 25.7]| 27.6    | [24.7 - 30.7]| 2.16            |
| 'LcVMC4.fna'  | Lactobacillus kefirgranaci ATCC 43761   | 27.4    | [24.0 - 31.0]| 23.2    | [20.9 - 25.6]| 25.4    | [22.5 - 28.5]| 0.43            |
| Query                     | Subject                                                                 | d₀   | C.I. d₀ | d₁   | C.I. d₁ | d₄   | C.I. d₄ | d₅   | C.I. d₅ | Diff. G+C Percent |
|---------------------------|--------------------------------------------------------------------------|------|---------|------|---------|------|---------|------|---------|------------------|
| 'LcSJ3CUS.fna'            | Lactobacillus ultunensis DSM 16047                                      | 29.7 | [26.3 - 33.3] | 23.2 | [20.9 - 25.7] | 27.1 | [24.2 - 30.2] | 0.82 |
| 'LcV4.fna'                | Lactobacillus ultunensis DSM 16047                                      | 28.9 | [25.6 - 32.6] | 23.1 | [20.8 - 25.5] | 26.5 | [23.7 - 29.7] | 1.1  |
| 'LcVMC7.fna'              | Lactobacillus kefirgranum DSM 8572                                       | 27.7 | [24.3 - 31.3] | 23.1 | [20.8 - 25.5] | 25.6 | [22.7 - 29.7] | 0.78 |
| 'LcVMC5.fna'              | Lactobacillus kefirgranum DSM 8572                                       | 28.4 | [25.0 - 32.0] | 23.1 | [20.8 - 25.5] | 26.1 | [23.2 - 29.2] | 0.51 |
| 'LcVMC1.fna'              | Lactobacillus kefirgranum DSM 8572                                       | 27.7 | [24.4 - 31.3] | 23.1 | [20.8 - 25.5] | 25.6 | [22.8 - 28.7] | 0.58 |
| 'LcMC4.fna'               | Lactobacillus kefirgranum ATCC 43761                                     | 27.6 | [24.2 - 31.2] | 23.1 | [20.9 - 25.6] | 25.5 | [22.7 - 28.6] | 0.63 |
| 'LcVMC6.fna'              | Lactobacillus kefirgranum ATCC 43761                                     | 27.5 | [24.2 - 31.1] | 23.1 | [20.8 - 25.6] | 25.5 | [22.6 - 28.6] | 0.42 |
| 'LcVMC2.fna'              | Lactobacillus kefirgranum ATCC 43761                                     | 28.2 | [24.8 - 31.8] | 23.1 | [20.8 - 25.5] | 26.0 | [23.1 - 29.1] | 0.86 |
| 'LcVMC1.fna'              | Lactobacillus ultunensis DSM 16047                                       | 29.2 | [25.8 - 32.8] | 23.1 | [20.8 - 25.6] | 26.8 | [23.9 - 29.9] | 0.88 |
| 'LcVMC6.fna'              | Lactobacillus acidophilus NBRC 13951                                     | 28.7 | [25.3 - 32.3] | 23.1 | [20.8 - 25.6] | 26.3 | [23.4 - 29.4] | 0.98 |
| 'LcVMC2.fna'              | Lactobacillus ultunensis DSM 16047                                       | 28.4 | [25.0 - 32.0] | 23.1 | [20.8 - 25.6] | 26.1 | [23.2 - 29.2] | 0.96 |
| 'LcVMC8.fna'              | Lactobacillus ultunensis DSM 16047                                       | 27.7 | [24.3 - 31.3] | 23.1 | [20.8 - 25.6] | 25.6 | [22.7 - 28.7] | 0.9  |
| 'LcVMC5.fna'              | Lactobacillus kefirgranum DSM 8572                                       | 28.1 | [24.7 - 31.7] | 23.1 | [20.9 - 25.6] | 25.9 | [23.0 - 29.0] | 0.3  |
| 'LcMC4.fna'               | Lactobacillus ultunensis DSM 16047                                       | 28.3 | [25.0 - 32.0] | 23.1 | [20.8 - 25.6] | 26.1 | [23.2 - 29.2] | 0.86 |
| 'LcVMC6.fna'              | Lactobacillus kefirgranum DSM 8572                                       | 27.9 | [24.5 - 31.5] | 23.0 | [20.7 - 25.4] | 25.7 | [22.8 - 28.8] | 0.63 |
| 'LcV4.fna'                | Lactobacillus kefirgranum DSM 8572                                       | 28.6 | [25.3 - 32.3] | 23.0 | [20.7 - 25.5] | 26.3 | [23.4 - 29.4] | 0.39 |
| 'LcVMC2.fna'              | Lactobacillus kefirgranum DSM 8572                                       | 27.5 | [24.1 - 31.1] | 23.0 | [20.7 - 25.5] | 25.4 | [22.6 - 28.5] | 0.53 |
| 'LcV4.fna'                | Lactobacillus kefirgranum ATCC 43761                                     | 28.1 | [24.8 - 31.7] | 23.0 | [20.7 - 25.4] | 25.9 | [23.0 - 29.0] | 0.19 |
| 'LcVMC3.fna'              | Lactobacillus ultunensis DSM 16047                                       | 28.6 | [25.2 - 32.2] | 23.0 | [20.7 - 25.5] | 26.2 | [23.3 - 29.3] | 0.7  |
| 'LcVMC7.fna'              | Lactobacillus ultunensis DSM 16047                                       | 29.9 | [26.5 - 33.5] | 23.0 | [20.7 - 25.5] | 27.2 | [24.3 - 30.3] | 0.63 |
| 'LcVMC1.fna'              | Lactobacillus kefirgranum DSM 8572                                       | 28.9 | [25.5 - 32.5] | 22.9 | [20.6 - 25.3] | 26.4 | [23.5 - 29.5] | 0.61 |
| Query          | Subject                                                   | $d_0$ | C.I. $d_0$ | $d_4$ | C.I. $d_4$ | $d_6$ | C.I. $d_6$ | Diff. G+C Percent |
|----------------|-----------------------------------------------------------|-------|------------|-------|------------|-------|------------|------------------|
| 'LcVMC1.fna'   | *Lactobacillus kefiranofaciens* ATCC 43761                | 28.1  | [24.7 - 31.7] | 22.9  | [20.6 - 25.4] | 25.9  | [23.0 - 29.0] | 0.41             |
| 'LcVMC3.fna'   | *Lactobacillus kefiranofaciens* subsp. kefirgranum JCM 8572 | 29.8  | [26.4 - 33.4] | 22.8  | [20.5 - 25.2] | 27.1  | [24.2 - 30.2] | 0.86             |
| 'LcVMC3.fna'   | *Lactobacillus kefiranofaciens* ATCC 43761                | 29.0  | [25.6 - 32.6] | 22.8  | [20.5 - 25.3] | 26.5  | [23.6 - 29.6] | 0.65             |
| Strain                                           | Authority                   | Other deposits                                                                 | Synonyms                                                                 | Base pairs | Percent G+C | No. proteins | Goldstamp     | Bioproject accession | Biosample accession | Assembly accession | IMG OID          |
|-------------------------------------------------|-----------------------------|--------------------------------------------------------------------------------|----------------------------------------------------------------------------|------------|-------------|--------------|---------------|---------------------|---------------------|-------------------|-------------------|
| *Lactobacillus suntoryeus* LMG 22464             | Cachat and Priest 2005      | NCIMB 14005; SA                                                                 | Lactobacillus suntoryeus                                                   | 1760       | 36.5        | 1825         | Gp0131240     | PRJNA224116         | SAMN02797793       | GCF_001437535     |
| *Lactobacillus kefiranofaciens* ATCC 43761       | Fujisawa et al. 1988 emend. | Vancanneyt et al. 2004                                                          | Lactobacillus kefiranofaciens; Lactobacillus kefiranofaciens subsp. kefiranofaciens | 2281       | 37.2        | 2367         | Gp0099413     | PRJNA257853         | SAMN02983011       | GCA_900103655     | 2597490363       |
| *Lactobacillus helveticus* DSM 20075             | (Orla-Jensen 1919) Bergey et al. 1925 | LMG 13555; LMG 6413; NRRL B-4526; CCUG 30139; ATCC 15009; JCM 1120; IFO 15019; NBRC 15019; CIP 103146 | Lactobacillus helveticus, Thermobacterium helveticum                     | 1804       | 36.8        | 2078         | Gp0003635     | PRJNA34619          | SAMN00139430       | GCA_000160855     | 645951865        |
| *Lactobacillus ultunensis* DSM 16047             | Roos et al. 2005            | LMG 22117; CCUG 48460; JCM 16177; Kx146C1                                      | Lactobacillus ultunensis                                                   | 2159       | 35.9        | 2210         | Gp0003665     | PRJNA31505          | SAMN00001484       | GCA_000159415     | 643886047        |
| Strain                                   | Authority                                      | Other deposits            | Synonyms                                                                 | Base pairs | Percent G+C | No. proteins | Goldstamp     | Bioproject accession | Biosample accession | Assembly accession | IMG OID          |
|-----------------------------------------|-----------------------------------------------|---------------------------|--------------------------------------------------------------------------|------------|-------------|--------------|---------------|----------------------|---------------------|---------------------|------------------|
| Lactobacillus acidophilus NBRC 13951    | (Moro 1900) Hansen and Morquot 1970          | LMG 13350; LMG 9433; BCRB 10695; NRRL B-4495; CCUG 5917; DSM 20079; ATCC 4355; NCTC 12980; JCM 1132; IFO 13951; VKM B-1660; CIP 76.13 | Bacillus acidophilus; Lactobacillus acidophilus | 1955       | 34.6        | 1873         | Gp0075770      | PRJDB1353            | SAMD00046914        | GCA_001591845      |
| Lactobacillus kitasatonis JCM 1039      | Mukai et al. 2003                             | KCTC 3155; DSM 16761      | Lactobacillus kitasatonis                                                | 1902       | 37.5        | 2050         | Gp0026726      | PRJDB640             | SAMD00016339        | GCA_000615285      | 2565956592        |
| Lactobacillus gallinarum JCM 2011       | Fujisawa et al. 1992                          | LMG 9435; CCUG 30724; DSM 10532; ATCC 33199; CIP 103611; VPI 1294 | Lactobacillus gallinarum                                                 | 1918       | 36.5        | 2076         | Gp0091989      | PRJDB621             | SAMD00003603        | GCA_000614735      |
| Lactobacillus kefiranofaciens subsp. kefirgranum JCM 8572 | (Takizawa et al. 1994) Vancanneyt et al. 2004 | LMG 15132; CCUG 39467; CCUG 49353; DSM 10550; ATCC 51647; CIP 104241; GCL 1701 | Lactobacillus kefiranofaciens subsp. kefirgranum; Lactobacillus kefirgranum | 2065       | 37.4        | 2918         | Gp0093297      | PRJDB772             | SAMD00000473        | GCA_001311335      |
| Lactobacillus crispatus JCM 1185        | (Brygoo and Aladame 1953) Moore and Holdeman 1970, emend. Cato et al. 1983 | LMG 9479; CCUG 30722; DSM 20584; ATCC 33820; CIP 102990; CIPP II; VPI 3199 | Eubacterium crispatum; Lactobacillus crispatus                          | 2033       | 36.6        | 3305         | Gp0093095      | PRJDB800             | SAMD00000420        | GCA_001311685      |
| Strain                     | Authority            | Other deposits | Synonyms                                 | Base pairs | Percent G+C | No. proteins | Goldstamp    | Bioproject accession | Biosample accession | Assembly accession | Assembly accession | IMG OID         |
|---------------------------|----------------------|----------------|------------------------------------------|------------|-------------|--------------|--------------|---------------------|--------------------|-------------------|-------------------|-----------------|
| *Lactobacillus amylovorus* DSM 20531 | Nakamura 1981       | LMG 9496; NRRL B-4540; CCUG 27201; ATCC 33620; JCM 1126; CIP 102989; NCAIM B.01458 | *Lactobacillus amylovorus* | 2016 257 | 37.8         | 2045         | Gp0130192   | PRJNA224116          | SAMN02369422      |                |                  | GCF_001433985   |
| *Lactobacillus sobrius* DSM 16698 | Konstantinov et al. 2006 | 1; NCCB 100067; OTU171-001 | *Lactobacillus sobrius* | 1992 054 | 37.8         | 1950         | Gp0131222   | PRJNA224116          | SAMN02797775      |                |                  | GCF_001437365   |
| LcSJ3CUS.fna               |                      |                |                                          | 2087 874   | 36.7         |              |             |                     |                    |                  |                  |                |
| LcV4.fna                   |                      |                |                                          | 2091 889   | 37.0         |              |             |                     |                    |                  |                  |                |
| LcVMC1.fna                 |                      |                |                                          | 2074 052   | 36.8         |              |             |                     |                    |                  |                  |                |
| LcVMC2.fna                 |                      |                |                                          | 2201 962   | 36.9         |              |             |                     |                    |                  |                  |                |
| LcVMC3.fna                 |                      |                |                                          | 2201 463   | 36.6         |              |             |                     |                    |                  |                  |                |
| LcVMC4.fna                 |                      |                |                                          | 2314 219   | 36.8         |              |             |                     |                    |                  |                  |                |
| LcVMC5.fna                 |                      |                |                                          | 2242 963   | 36.9         |              |             |                     |                    |                  |                  |                |
| LcVMC6.fna                 |                      |                |                                          | 2343 949   | 36.8         |              |             |                     |                    |                  |                  |                |
| LcVMC7.fna                 |                      |                |                                          | 2101 584   | 36.6         |              |             |                     |                    |                  |                  |                |
| LcVMC8.fna                 |                      |                |                                          | 2332 118   | 36.8         |              |             |                     |                    |                  |                  |                |
Methods, Results and References

The genome sequence data were uploaded to the Type (Strain) Genome Server (TYGS), a free bioinformatics platform available under https://tygs.dsmz.de, for a whole genome-based taxonomic analysis [1]. The results were provided by the TYGS on 2020-05-25. In brief, the TYGS analysis was subdivided into the following steps:

**Determination of closely related type strains**

Determination of closest type strain genomes was done in two complementary ways: First, all user genomes were compared against all type strain genomes available in the TYGS database via the MASH algorithm, a fast approximation of intergenomic relatedness [2], and, the ten type strains with the smallest MASH distances chosen per user genome. Second, an additional set of ten closely related type strains was determined via the 16S rDNA gene sequences. These were extracted from the user genomes using RNAmmer [3] and each sequence was subsequently BLASTed [4] against the 16S rDNA gene sequence of each of the currently 11767 type strains available in the TYGS database. This was used as a proxy to find the best 50 matching type strains (according to the bitscore) for each user genome and to subsequently calculate precise distances using the Genome BLAST Distance Phylogeny approach (GBDP) under the algorithm 'coverage' and distance formula \( d_5 \) [5]. These distances were finally used to determine the 10 closest type strain genomes for each of the user genomes.

**Pairwise comparison of genome sequences**

All pairwise comparisons among the set of genomes were conducted using GBDP and accurate intergenomic distances inferred under the algorithm 'trimming' and distance formula \( d_5 \) [5]. 100 distance replicates were calculated each. Digital DDH values and confidence intervals were calculated using the recommended settings of the GGDC 2.1 [5].

**Phylogenetic inference**

The resulting intergenic distances were used to infer a balanced minimum evolution tree with branch support via FASTME 2.1.4 including SPR postprocessing [6]. Branch support was inferred from 100 pseudo-bootstrap replicates each. The trees were rooted at the midpoint [7] and visualized with PhyD3 [8].

**Type-based species and subspecies clustering**

The type-based species clustering using a 70% dDDH radius around each of the 11 type strains was done as previously described [1]. The resulting groups are shown in Table 1 and 4. Subspecies clustering was done using a 79% dDDH threshold as previously introduced [9].

**Results**

**Type-based species and subspecies clustering**

The resulting species and subspecies clusters are listed in Table 4, whereas the taxonomic identification of the query strains is found in Table 1. Briefly, the clustering yielded 8 species clusters and the provided query strains were assigned to 1 of these. Moreover, user strains were located in 1 of 10 subspecies clusters.

**Figure caption genome tree**

**Figure 1.** Tree inferred with FastME 2.1.6.1 [6] from GBDP distances calculated from genome sequences. The branch lengths are scaled in terms of GBDP distance formula \( d_5 \). The numbers above branches are GBDP pseudo-bootstrap support values > 60 % from 100 replications, with an average branch support of 69.7 %. The tree was rooted at the midpoint [7].

**Figure caption SSU tree**

**Figure 2.** Tree inferred with FastME 2.1.6.1 [6] from GBDP distances calculated from 16S rDNA gene sequences. The branch lengths are scaled in terms of GBDP distance formula \( d_5 \). The numbers above branches are GBDP pseudo-bootstrap support values > 60 % from 100 replications, with an average branch support of 49.3 %. The tree was rooted at the midpoint [7].
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