# Appendices

## APPENDIX A

## Media

Various media were used in this study including isolation media and test media and they were prepared as the following formula (per liter).

**1. Gas production test medium**

| | | |
|---|---|---|
| MRS broth | 100 | ml |
| Bromocresol green | 0.025 | g |

pH 6.5

Dispensed into containers and autoclaved at 121°C for 15 minutes.

**2. de Man Rogosa Sharpe (MRS) medium** ( per liter) (Merck®, Germany)

| | | |
|---|---|---|
| Peptone from casein | 10 | g |
| Meat extract | 8 | g |
| Yeast extract | 4 | g |
| D(+)-glucose | 20 | g |
| di-Potassium hydrogen phosphate | 2 | g |
| Tween 80 | 1 | ml |
| di-Ammonium hydrogen citrate | 2 | g |
| Sodium acetate | 5 | g |
| Magnesium sulfate | 0.2 | g |
| Manganese sulfate | 0.04 | g |

pH 6.5

Dispensed into containers and autoclaved at 121°C for 15 minutes.

**3. de Man Rogosa Sharpe (MRS) medium with bromocresol green**

| | | |
|---|---|---|
| MRS broth | 100 | ml |
| Bromocresol green | 0.025 | g |

pH 6.5

Dispensed into containers and autoclaved at 121°C for 15 minutes.

**4. Luria Bertani (LB) medium** (per liter)

| | | |
|---|---|---|
| Bacto-tryptone | 10 | g |
| Bacto yeast extract | 5 | g |
| Sodium chloride | 10 | g |
| Glucose | 1 | g |

pH 7

Dispensed into containers and autoclaved at 121°C for 15 minutes.

**5. Luria Bertani (LB) medium with ampicillin (100 mg/ml)**

LB broth

Dispensed into containers and autoclaved at 121°C for 15 minutes. Let it cool to 45-50°C. Added 100 mg/ml ampicillin to final concentration as 100 µg/ml.

**6. Mueller-Hinton broth (MHB) medium** (per liter) (Merck®, Germany)

| | | |
|---|---|---|
| Infusion from meat | 2 | g |
| Casein hydrolysate | 17.5 | g |
| Starch | 1.5 | g |

pH 7

Dispensed into containers and autoclaved at 121°C for 15 minutes.

**7. Modified MRS medium for fermentation of 22 carbohydrates and substrate utilization** (per liter)

| | | |
|---|---|---|
| Peptone | 10 | g |
| Yeast extract | 5 | g |
| di-Potassium hydrogen phosphate | 5 | g |
| di-Ammonium hydrogen citrate | 2 | g |
| Sodium acetate | 5 | g |
| Magnesium sulfate | 0.5 | g |
| Manganese sulfate | 0.2 | g |
| Tween 80 | 1 | ml |

pH 6.5

Dispensed into containers and added 1% of carbohydrates and substrates to each media and autoclaved at 110°C for 20 minutes.



**8. Motility test medium**

| | | |
|---|---|---|
| MRS broth | 100 | ml |
| Agar | 0.5 | g |

pH 6.5

Dispensed into containers and autoclaved at 121°C for 15 minutes.

**9. Tryptic Soy Broth (TSB)** (per liter) (Merck®, Germany)

| | | |
|---|---|---|
| Peptone from casein | 17 | g |
| Peptone from soymeal | 3 | g |
| D(+)-glucose | 2.5 | g |
| Sodium chloride | 5 | g |
| di-Potassium hydrogen phosphate | 2.5 | g |

pH 7

Dispensed into containers and autoclaved at 121°C for 15 minutes.

## APPENDIX B

### Chemical reagents for agarose gel electrophoresis

**1. 0.8% Agarose**

| | | |
|---|---|---|
| Agarose | 0.8 | g |
| Distilled water | 100 | ml |

**2. 1% Agarose**

| | | |
|---|---|---|
| Agarose | 1 | g |
| Distilled water | 100 | ml |

**3. 0.5 M EDTA**

| | | |
|---|---|---|
| EDTA | 18.6 | g |
| Sodium hydroxide | 2 | g |
| Distilled water | 88 | ml |
| pH 8.0 | | |

**4. Ethidium bromide (1 mg/ml)**

| | | |
|---|---|---|
| Ethidium bromide | 1 | mg |
| Distilled water | 1 | ml |

**5. Loading dye (5X)**

| | | |
|---|---|---|
| 5X TAE | | |
| Bromphenol blue | 0.05 | % |
| Glycerol | 50 | % |

**6. 1 M Tris-HCl**

| | | |
|---|---|---|
| Tris base | 121 | g |

| | | |
|---|---|---|
| Conc HCl (37% v/v) | 48.3 | g |
| Distilled water | 845 | ml |

pH 8.0

**7. TAE buffer (50X)**

| | | |
|---|---|---|
| Tris base | 242 | g |
| Glacial acetic acid | 57.1 | ml |
| 0.5 M EDTA pH 8 | 100 | ml |

Added distilled water to 1,000 ml

## APPENDIX C

## Nucleotide sequences and GenBank accession numbers of 16S rRNA gene of 12 plasmid containing *Lactobacillus* spp.

### 1. *L. plantarum* A15

LOCUS GQ900597 1424 bp DNA linear BCT 12-OCT-2009
DEFINITION *Lactobacillus plantarum* strain A15 16S ribosomal RNA gene, partial sequence.
ACCESSION GQ900597
VERSION GQ900597.1 GI:260685288
KEYWORDS .
SOURCE *Lactobacillus plantarum*
ORGANISM *Lactobacillus plantarum*
Bacteria; Firmicutes; Lactobacillales; Lactobacillaceae; Lactobacillus.
REFERENCE 1 (bases 1 to 1424)
AUTHORS Auputinan,P. and Thongwai,N.
TITLE Distribution and Diversity of Plasmids in Lactobacilli Isolated from Fermented Foods
JOURNAL Unpublished
REFERENCE 2 (bases 1 to 1424)
AUTHORS Auputinan,P. and Thongwai,N.
TITLE Direct Submission
JOURNAL Submitted (10-SEP-2009) Department of Biology, Chiang Mai University, 239 Huaykaew Rd., Muang, Chiang Mai 50200, Thailand
FEATURES Location/Qualifiers
source 1..1424
/organism="*Lactobacillus plantarum*"
/mol_type="genomic DNA"
/strain="A15"
/db_xref="taxon:1590"
/PCR_primers="fwd_seq: tgcctaatacatgcaagt, rev_seq: cttgttacgacttcaccc"
rRNA <1..>1424
/product="16S ribosomal RNA"

ORIGIN
1 ggcggtgatt gggctgcatc atgatttcat ttgagtgagt ggcgaactgg tgagtaacac
61 gtgggaaacc tgcccagaag cgggggataa cacctggaaa cagatgctaa taccgcataa
121 caacttggac cgcatggtcc gagcttgaaa gatggcttcg gctatcactt ttggatggtc
181 ccgcggcgta ttagctagat ggtggggtaa cggctcacca tggcaatgat acgtagccga
241 cctgagaggg taatcggcca cattgggact gagacacggc ccaaactcct acgggaggca
301 gcagtaggga atcttccaca atggacgaaa gtctgatgga gcaacgccgc gtgagtgaag
361 aagggtttcg gctcgtaaaa ctctgttgtt aaagaagaga catatctgag agtaactgtt
421 caggtattga cggtatttaa ccagaaagcc acggctaact acgtgccagc agccgcggta
481 atacgtaggt ggcaagcgtt gtccggattt attgggcgta aagcgagcgc aggcggtttt
541 ttaagtctga tgtgaaagcc ttcggctcaa ccgaagaagt gcatcggaaa ctgggaaact
601 tgagtgcaga agaggacagt ggaactccat gtgtagcggt gaaatgcgta gatatatgga
661 agaacaccag tggcgaaggc ggctgtctgg tctgtaactg acgctgaggc tcgaaagtat
721 gggtagcaaa caggattaga taccctggta gtccataccg taaacagagg aatgaaaatt
781 gtggaagggt ttccgcccgt tcagtgcggc agctagcgca ttaagcattc ggccgggga
841 gtgacggccg caaggatgga actcagagga attgacgggg gcccgcacaa gcggtggagc

```
      901 atgtggttta attagaagct acgcgaagaa ccttaccagg tcttgacata ctaggcaaat
      961 ctaagagatt agacgttccc ttcggggaca tggatacagg tggtgcatgg ttgtcgtcag
     1021 ctcgtgtcgt gagatgttgg gttaagtccc gcaacgagcg caacccttat tatcagttgc
     1081 cagcattaag ttgggcactc tggtgagact gccggtgaca aaccggagga aggtggggat
     1141 gacgtcaaat catcatgccc cttatgacct gggctacaca cgtgctacaa tggatggtac
     1201 aacgagttgc gaactcgcga gagtaagcta atctcttaaa gccattctca gttcggattg
     1261 taggctgcaa ctcgcctaca tgaagtcgga atcgctagta atcgcggatc agcatgccgc
     1321 ggtgaatacg ttcccgggcc ttgtacacac cgcccgtcac accatgagag tttgtaacac
     1381 ccaaagtcgg tggggtacct tttagaaccg cgctaaggac attt
```

## 2. *L. brevis* D11

```
LOCUS       GQ900598    1018 bp    DNA     linear   BCT 12-OCT-2009
DEFINITION  Lactobacillus brevis strain D11 16S ribosomal RNA gene, partial
            sequence.
ACCESSION   GQ900598
VERSION     GQ900598.1  GI:260685289
KEYWORDS    .
SOURCE      Lactobacillus brevis
  ORGANISM  Lactobacillus brevis
            Bacteria; Firmicutes; Lactobacillales; Lactobacillaceae;
            Lactobacillus.
REFERENCE   1  (bases 1 to 1018)
  AUTHORS   Auputinan,P. and Thongwai,N.
  TITLE     Distribution and Diversity of Plasmids in Lactobacilli Isolated
            from Fermented Foods
  JOURNAL   Unpublished
REFERENCE   2  (bases 1 to 1018)
  AUTHORS   Auputinan,P. and Thongwai,N.
  TITLE     Direct Submission
  JOURNAL   Submitted (10-SEP-2009) Department of Biology, Chiang Mai
            University, 239 Huaykaew Rd., Muang, Chiang Mai 50200, Thailand
FEATURES             Location/Qualifiers
     source          1..1018
                     /organism="Lactobacillus brevis"
                     /mol_type="genomic DNA"
                     /strain="D11"
                     /db_xref="taxon:1580"
                     /PCR_primers="fwd_seq: tgcctaatacatgcaagt, rev_seq:
                     cttgttacgacttcaccc"
     rRNA            <1..>1018
                     /product="16S ribosomal RNA"
ORIGIN
        1 acacctttga gagtaactgt tcaagggttg acggtattta accagaaagc cacggctaac
       61 tacgtgccag cagccgcggt aatacgtagg tggcaagcgt tgtccggatt tattgggcgt
      121 aaagcgagcg caggcggttt tttaagtctg atgtgaaagc cttcggctta accggagaag
      181 tgcatcggaa actgggaaaa ttggattcca gaaggggcca gtgggactcc atgggagggg
      241 gggaaagggg tagatatagg gaggaacccc aggggcgaag gcggctgttt agtctgtaac
      301 tggcggtggg gctggaaagc atgggtgggg aacaggatta gataccctgg tagtccatgc
      361 ggtaaacgat gagtgttaag tgtgggaggg tttccgccct tcagtggtgc agctaacgca
      421 ttaagcactc cgcctgggga gtacgaccgc aaggttgaaa ctcaaaggaa ttgacggggg
      481 cccgcacaag cggtggagca tgtggtttaa ttcgaagcta cgcgaagaac cttaccaggt
      541 cttgacatct tctgccaatc ttagagataa gacgttccct tcggggacag aatgacaggt
      601 ggtgcatggt tgtcgtcagc tcgtgtcgtg agatgttggg ttaagtcccg caacgagcgc
      661 aacccttatt atcagttgcc agcattcagt tgggcactct ggtgagactg ccggtgacaa
      721 accggaggaa ggtggggatg acgtcaaatc atcatgcccc ttatgacctg ggctacacac
      781 gtgctacaat ggacggtaca acgagtcgcg aagtcgtgag gctaagctaa tctcttaaag
      841 ccgttctcag ttcggattgt aggctgcaac tcgcctacat gaagttggaa tcgctagtaa
      901 tcgcggatca gcatgccgcg gtgaatacgt tcccgggcct tgtacacacc gcccgtcaca
      961 ccatgagagt ttgtaacacc caaagccggt gagatacctc ggatcagcgt aaggtatt
```

### 3. *L. brevis* D13

LOCUS GQ900599 1418 bp DNA linear BCT 12-OCT-2009
DEFINITION *Lactobacillus brevis* strain D13 16S ribosomal RNA gene, partial sequence.
ACCESSION GQ900599
VERSION GQ900599.1 GI:260685290
KEYWORDS .
SOURCE *Lactobacillus brevis*
ORGANISM *Lactobacillus brevis*
Bacteria; Firmicutes; Lactobacillales; Lactobacillaceae; Lactobacillus.
REFERENCE 1 (bases 1 to 1418)
AUTHORS Auputinan,P. and Thongwai,N.
TITLE Distribution and Diversity of Plasmids in Lactobacilli Isolated from Fermented Foods
JOURNAL Unpublished
REFERENCE 2 (bases 1 to 1418)
AUTHORS Auputinan,P. and Thongwai,N.
TITLE Direct Submission
JOURNAL Submitted (10-SEP-2009) Department of Biology, Chiang Mai University, 239 Huaykaew Rd., Muang, Chiang Mai 50200, Thailand
FEATURES Location/Qualifiers
source 1..1418
/organism="*Lactobacillus brevis*"
/mol_type="genomic DNA"
/strain="D13"
/db_xref="taxon:1580"
/PCR_primers="fwd_seq: tgcctaatacatgcaagt, rev_seq: cttgttacgacttcaccc"
rRNA <1..>1418
/product="16S ribosomal RNA"
ORIGIN

```
      1 tttccatgtt agagtgctgc ctgatttcac atgaagcgag tggcgaactg gtgagtaaca
     61 cgtggggaat ctgcccagaa gcaggggata acacttggaa acaggtgcta ataccgtata
    121 acaacaaaat ccgcatggat tttgtttgaa aggtggcttc ggctatcact tctggatgat
    181 cccgcggcgt attagttagt tggtgaggta aaggcccacc aagacgatga tacgtagccg
    241 acctgagagg gtaatcggcc acattgggac tgagacacgg cccaaactcc tacgggaggc
    301 agcagtaggg aatcttccac aatggacgaa agtctgatgg agcaatgccg cgtgagtgaa
    361 gaagggtttc ggctcgtaaa actctgttgt taaagaagag acacctttga gagtaactgt
    421 tcaagggttg acggtattta accagaaagc cacggctaac tacgtgccag cagccgcggt
    481 aatacgtagg tggcaagcgt tgtccggatt tattgggcgt aaagcgagcg caggcggttt
    541 tttaagtctg atgtgaaagc cttcggctta accggagaaa tgcctttgga aactgggaaa
    601 cttgagtgca gaagaggaca gtggaattcc atgtgtagcg gtggaaggcg tagatatatg
    661 gaagaacacc agtggcgaag gcggctgtgt agtctgtaac tgacgctgag gctcgaaagc
    721 atgggtagcg aacaggatta gataccctgg tagtccatgc cgtaaacgat gagtgctaag
    781 tgttggaggg tttccgccct tcagtgctgc agctaacgca ttaagcactc cgcctgggga
    841 gtacgaccgc aaggttgaaa ctcaaaggaa ttgacggggg cccgcacaag cggtggagca
    901 tgtggtttaa ttcgaagcta cgcgaagaac cttaccaggt cttgacatct tctgccaatc
    961 ttagagataa gacgttccct tcggggacag aatgacaggt ggtgcatggt tgtcgtcagc
   1021 tcgtgtcgtg agatgttggg ttaagtcccg caacgagcgc aacccttatt atcagttgcc
   1081 agcattcagt tgggcactct ggtgagactg ccggtgacaa accggaggaa ggtggggatg
   1141 acgtcaaatc atcatgcccc ttatgacctg ggctacacac gtgctacaat ggacggtaca
   1201 acgagtcgcg aagtcgtgag gctaagctaa tctcttaaag ccgttctcag ttcggattgt
   1261 aggctgcaac tcgcctacat gaagttggaa tcgctagtaa tcgcggatca gcatgccgcg
   1321 gtgaatacgt tcccgggcct tgtacacacc gcccgtcaca ccatgagagt ttgtaacacc
   1381 caaagccggg agatacttcg gatcagctta aggcactt
```

## 4. *L. brevis* E6

LOCUS GQ900600 1415 bp DNA linear BCT 12-OCT-2009
DEFINITION *Lactobacillus brevis* strain E6 16S ribosomal RNA gene, partial sequence.
ACCESSION GQ900600
VERSION GQ900600.1 GI:260685291
KEYWORDS .
SOURCE *Lactobacillus brevis*
ORGANISM *Lactobacillus brevis*
Bacteria; Firmicutes; Lactobacillales; Lactobacillaceae; Lactobacillus.
REFERENCE 1 (bases 1 to 1415)
AUTHORS Auputinan,P. and Thongwai,N.
TITLE Distribution and Diversity of Plasmids in Lactobacilli Isolated from Fermented Foods
JOURNAL Unpublished
REFERENCE 2 (bases 1 to 1415)
AUTHORS Auputinan,P. and Thongwai,N.
TITLE Direct Submission
JOURNAL Submitted (10-SEP-2009) Department of Biology, Chiang Mai University, 239 Huaykaew Rd., Muang, Chiang Mai 50200, Thailand
FEATURES Location/Qualifiers
source 1..1415
/organism="*Lactobacillus brevis*"
/mol_type="genomic DNA"
/strain="E6"
/db_xref="taxon:1580"
/PCR_primers="fwd_seq: tgcctaatacatgcaagt, rev_seq: cttgttacgacttcaccc"
rRNA <1..>1415
/product="16S ribosomal RNA"
ORIGIN

```
      1 ggatctagag tgctgcctga tttcacaatg aagcgagtgg cgaactggtg agtaacacgt
     61 gggaaatctg cccagaagca ggggataaca cttggaaaca ggtgctaata ccgtataaca
    121 acaaaatccg catggatttt gtttgaaagg tggcttcggc tatcacttct ggatgatccc
    181 gcggcgtatt agttagttgg tgaggtaaag gcccaccaag acgatgatac gtagccgacc
    241 tgagagggta atcggccaca ttgggactga gacacggccc aaactcctac gggaggcagc
    301 agtagggaat cttccacaat ggacgaaagt ctgatggagc aatgccgcgt gagtgaagaa
    361 gggtttcggc tcgtaaaact ctgttgttaa agaagagaca cctttgagag taactgttca
    421 agggttgacg gtatttaacc agaaagccac ggctaactac gtgccagcag ccgcggtaat
    481 acgtaggtgg caagcgttgt ccggatttat tgggcgtaaa gcgagcgcag gcggtttttt
    541 aagtctgatg tgaaagcctt cggcttaacc ggagaagtgc atcggaaact gggagactgg
    601 agtgcagaag aggacagtgg aactccatgt gtagcggtgg aatgcgtaga tatatggaag
    661 aacaccagtg gcgaaggcgg ctgtctagtc tgtaactgac gctgaggctc gaaagcatgg
    721 gtagcgaaca ggattagata ccctggtagt ccatgccgta aacgatgagt gctaagtgtt
    781 ggagggtttc cgcccttcag tgctgcagct aacgcattaa gcactccgcc tggggagtac
    841 gaccgcaagg ttgaaactca aaggaattga cgggggcccg cacaagcggt ggagcatgtg
    901 gtttaattcg aagctacgcg aagaacctta ccaggtcttg acatcttctg ccaatcttag
    961 agataagacg ttcccttcgg ggacagaatg acaggtggtg catggttgtc gtcagctcgt
   1021 gtcgtgagat gttgggttaa gtcccgcaac gagcgcaacc cttattatca gttgccagca
   1081 ttcagttggg cactctggtg agactgccgg tgacaaaccg gaggaaggtg gggatgacgt
   1141 caaatcatca tgccccttat gacctgggct acacacgtgc tacaatggac ggtacaacga
   1201 gtcgcgaagt cgtgaggcta agctaatctc ttaaagccgt tctcagttcg gattgtaggc
   1261 tgcaactcgc ctacatgaag ttggaatcgc tagtaatcgc ggatcagcat gccgcggtga
   1321 atacgttccc gggccttgta cacaccgccc gtcacaccat gagagtttgt aacacccaaa
   1381 gccggtgaga tacctcggat cagcctaagg caatt
```

**5. *L. brevis* E36**

```
LOCUS       GQ900601         1421 bp    DNA     linear   BCT 12-OCT-2009
DEFINITION  Lactobacillus brevis strain E36 16S ribosomal RNA gene, partial
            sequence.
ACCESSION   GQ900601
VERSION     GQ900601.1  GI:260685292
KEYWORDS    .
SOURCE      Lactobacillus brevis
  ORGANISM  Lactobacillus brevis
            Bacteria; Firmicutes; Lactobacillales; Lactobacillaceae;
            Lactobacillus.
REFERENCE   1  (bases 1 to 1421)
  AUTHORS   Auputinan,P. and Thongwai,N.
  TITLE     Distribution and Diversity of Plasmids in Lactobacilli Isolated
            from Fermented Foods
  JOURNAL   Unpublished
REFERENCE   2  (bases 1 to 1421)
  AUTHORS   Auputinan,P. and Thongwai,N.
  TITLE     Direct Submission
  JOURNAL   Submitted (10-SEP-2009) Department of Biology, Chiang Mai
            University, 239 Huaykaew Rd., Muang, Chiang Mai 50200, Thailand
FEATURES             Location/Qualifiers
     source          1..1421
                     /organism="Lactobacillus brevis"
                     /mol_type="genomic DNA"
                     /strain="E36"
                     /db_xref="taxon:1580"
                     /PCR_primers="fwd_seq: tgcctaatacatgcaagt, rev_seq:
                     cttgttacgacttcaccc"
     rRNA            <1..>1421
                     /product="16S ribosomal RNA"
ORIGIN
        1 aatgctagag tgctgcctga ttttacatga agcgagtggc gaactggtga gtaacacgtg
       61 ggaaatctgc ccagaagcag gggataacac ttggaaacag gtgctaatac cgtataacaa
      121 caaaatccgc atggattttg tttgaaaggt ggcttcggct atcacttctg gatgatcccg
      181 cggcgtatta gttagttggt gaggtaaagg cccaccaaga cgatgatacg tagccgacct
      241 gagagggtaa tcggccacat tgggactgag acacggccca aactcctacg ggaggcagca
      301 gtagggaatc ttccacaatg gacgaaagtc tgatggagca atgccgcgtg agtgaagaag
      361 ggtttcggct cgtaaaactc tgttgttaaa gaagagacac ctttgagagt aactgttcaa
      421 gggttgacgg tatttaacca gaaagccacg gctaactacg tgccagcagc cgcggtaata
      481 cgtaggtggc aagcgttgtc cggatttatt gggcgtaaag cgagtgcagg cggttttta
      541 agtctgatgt gaaagccttc ggcttaaccg gagaagtgca tcggaaactg ggagacttga
      601 gtgcagaaga ggacagtgga actccatgtg tagcggtgga atgcgtagat agatggaggg
      661 accaccgggg ggggagggag gcgtctaggt ttgtaatgga ggctgaggct gggaaggcca
      721 ggggtaggga acgggattag attacctggt agtccaggcg gtaaacgagg agtcgttaag
      781 tgtgggaggg tttccgccct ttagtgtggc agctaacgca ttaagcactc cgcctgggga
      841 gtacggccgc agggttgaaa ctcaaaggaa ttgacggggg cccgcacaag gggtggggca
      901 tgtggtttaa ttcgaaggta cgcgaagaac cttaccaggt cttgacatct tgtgccaatc
      961 ttagagataa gacgttccct tcggggacag aatgacaggg tggtgcatgg ttgtcgtcag
     1021 ctcgtgtcgt gagatgttgg gttaagtccc gcaacgagcg caacccttat tatcagttgc
     1081 cagcattcag ttgggcactc tggtgagact gccggtgaca aaccggagga aggtggggat
     1141 gacgtcaaat catcatgccc cttatgacct gggctacaca cgtgctacaa tggacggtac
     1201 aacgagttgg gaagtcgtga ggctaagcta atctcttaaa gccgttctca gttcggattg
     1261 taggctgcaa ctcgcctaca tgaagttgga atcgctagta atcgcggatc agcatgccgc
     1321 ggtgaatacg ttcccgggcc tggtacacac cgcccgtcac accagtgaga gtttgtaaca
     1381 cccaaagccg ggagatacct cgggagtcag ccttaggcgt t
```

**6. *L. brevis* E37**

```
LOCUS       GQ900602            1412 bp    DNA     linear   BCT 12-OCT-2009
DEFINITION  Lactobacillus brevis strain E37 16S ribosomal RNA gene, partial
            sequence.
ACCESSION   GQ900602
VERSION     GQ900602.1  GI:260685293
KEYWORDS    .
SOURCE      Lactobacillus brevis
  ORGANISM  Lactobacillus brevis
            Bacteria; Firmicutes; Lactobacillales; Lactobacillaceae;
            Lactobacillus.
REFERENCE   1  (bases 1 to 1412)
  AUTHORS   Auputinan,P. and Thongwai,N.
  TITLE     Distribution and Diversity of Plasmids in Lactobacilli Isolated
            from Fermented Foods
  JOURNAL   Unpublished
REFERENCE   2  (bases 1 to 1412)
  AUTHORS   Auputinan,P. and Thongwai,N.
  TITLE     Direct Submission
  JOURNAL   Submitted (10-SEP-2009) Department of Biology, Chiang Mai
            University, 239 Huaykaew Rd., Muang, Chiang Mai 50200, Thailand
FEATURES             Location/Qualifiers
     source          1..1412
                     /organism="Lactobacillus brevis"
                     /mol_type="genomic DNA"
                     /strain="E37"
                     /db_xref="taxon:1580"
                     /PCR_primers="fwd_seq: tgcctaatacatgcaagt, rev_seq:
                     cttgttacgacttcaccc"
     rRNA            <1..>1412
                     /product="16S ribosomal RNA"
ORIGIN
        1 aatgttagag tgctgcctga tttcacatga agcgagtggc gaactggtga gtaacacgtg
       61 ggaaatctgc ccagaagcag gggataacac ttggaaacag gtgctaatac cgtataacaa
      121 caaaatccgc atggattttg tttgaaaggt ggcttcggct atcacttctg gatgatcccg
      181 cggcgtatta gttagttggt gaggtaaagg cccaccaaga cgatgatacg tagccgacct
      241 gagagggtaa tcggccacat tgggactgag acacggccca aactcctacg ggaggcagca
      301 gtagggaatc ttccacaatg gacgaaagtc tgatggagca atgccgcgtg agtgaagaag
      361 ggtttcggct cgtaaaactc tgttgttaaa gaagaacacc tttgagagta actgttcaag
      421 ggttgacggt atttaaccag aaagccacgg ctaactacgt gccagcagcc gcggtaatac
      481 gtaggtggca agcgttgtcc ggatttattg ggcgtaaagc gagtgcaggc ggttttttaa
      541 gtctgatgtg aaagccttcg gcttaaccgg agaagtgcat cggaaactgg aagacttgag
      601 tgcagaagag gacagtggaa ctccatgtgt agcggtggaa tgcgtagata tatggaagaa
      661 caccagtggc gaaggcggct gtctagtctg taactgacgc tgaggctcga aagcatgggt
      721 agcgaacagg attagatacc ctggtagtcc atgccgtaaa cgatgagtgc taagtgttgg
      781 agggtttccg cccttcagtg ctgcagctaa cgcattaagc actccgcctg gggagtacga
      841 ccgcaaggtt gaaactcaaa ggaattgacg gggcccgca caagcggtgg agcatgtggt
      901 ttaattcgaa gctacgcgaa gaaccttacc aggtcttgac atcttctgcc aatcttagag
      961 ataagacgtt cccttcgggg acagaatgac aggtggtgca tggttgtcgt cagctcgtgt
     1021 cgtgagatgt tgggttaagt cccgcaacga gcgcaaccct tattatcagt tgccagcatt
     1081 cagttgggca ctctggtgag actgccggtg acaaaccgga ggaaggtggg gatgacgtca
     1141 aatcatcatg cccctttatga cctgggctac acacgtgcta caatggacgg tacaacgagt
     1201 cgcgaagtcg tgaggctaag ctaatctctt aaagccgttc tcagttcgga ttgtaggctg
     1261 caactcgcct acatgaagtt ggaatcgcta gtaatcgcgg atcagcatgc cgcggtgaat
     1321 acgttcccgg gccttgtaca caccgcccgt cacaccatga gagtttgtaa cacccaaagc
     1381 cgggagatac ctcggatcag cttaaggcgc tt
```

## 7. *L. plantarum* F31

```
LOCUS       GQ900603        1415 bp    DNA     linear   BCT 12-OCT-2009
DEFINITION  Lactobacillus plantarum strain F31 16S ribosomal RNA gene,
partial sequence.
ACCESSION   GQ900603
VERSION     GQ900603.1  GI:260685294
KEYWORDS    .
SOURCE      Lactobacillus plantarum
  ORGANISM  Lactobacillus plantarum
            Bacteria; Firmicutes; Lactobacillales; Lactobacillaceae;
            Lactobacillus.
REFERENCE   1  (bases 1 to 1415)
  AUTHORS   Auputinan,P. and Thongwai,N.
  TITLE     Distribution and Diversity of Plasmids in Lactobacilli Isolated
            from Fermented Foods
  JOURNAL   Unpublished
REFERENCE   2  (bases 1 to 1415)
  AUTHORS   Auputinan,P. and Thongwai,N.
  TITLE     Direct Submission
  JOURNAL   Submitted (10-SEP-2009) Department of Biology, Chiang Mai
            University, 239 Huaykaew Rd., Muang, Chiang Mai 50200, Thailand
FEATURES             Location/Qualifiers
     source          1..1415
                     /organism="Lactobacillus plantarum"
                     /mol_type="genomic DNA"
                     /strain="F31"
                     /db_xref="taxon:1590"
                     /PCR_primers="fwd_seq: tgcctaatacatgcaagt, rev_seq:
                     cttgttacgacttcaccc"
     rRNA            <1..>1415
                     /product="16S ribosomal RNA"
ORIGIN
        1 ccagttgatg ggcttgctat gatttacttt gagtgagtgg cgaactggtg agtaacacgt
       61 gggaaacctg cccagaagcg ggggataaca cctggaaaca gatgctaata ccgcataaca
      121 acttggaccg catggtccga gtttgaaaga tggcttcggc tatcactttt ggatggtccc
      181 gcggcgtatt agctagatgg tggggtaacg gctcaccatg gcaatgatac gtagccgacc
      241 tgagagggta atcggccaca ttgggactga gacacggccc aaactcctac gggaggcagc
      301 agtagggaat cttccacaat ggacgaaagt ctgatggagc aacgccgcgt gagtgaagaa
      361 gggtttcggc tcgtaaaact ctgttgttaa agaagaacat atctgagagt aactgttcag
      421 gtattgacgg tatttaacca gaaagccacg gctaactacg tgccagcagc cgcggtaata
      481 cgtaggtggc aagcgttgtc cggatttatt gggcgtaaag cgagcgcagg cggtttttta
      541 agtctgatgt gaaagccttc ggctcaaccg aagaagtgca tggaaaactg gggaaactgg
      601 agtgcggaag aggacagtgg gaactccagg tgtaggggtg aaatgggtag gtataggaag
      661 aaccccaggg ggaagggcgg ctgtctggtc tgtaactgac gcgagggctc gaaagtatgg
      721 gtagcaaaca ggattagata ccctggtagt ccataccgta aaggatgaat gctaagtgtg
      781 gaggggtttc cgcccttcag tgctgcagct aacgcattaa gcattccgcc tggggagtac
      841 ggccgcaagg ctgaaactca aaggaattga cgggggcccg cacaagcggt ggagcatgtg
      901 gtttaattcg aagctacgcg aagaacctta ccaggtcttg acatactatg caaatctaag
      961 agattagacg ttcccttcgg ggacatggat acaggtggtg catggttgtc gtcagctcgt
     1021 gtcgtgagat gttgggttaa gtcccgcaac gagcgcaacc cttattatca gttgccagca
     1081 ttaagttggg cactctggtg agactgccgg tgacaaaccg gaggaaggtg gggatgacgt
     1141 caaatcatca tgcccttat gacctgggct acacacgtgc tacaatggat ggtacaacga
     1201 gttgcgaact cgcgagagta agctaatctc ttaaagccat tctcagttcg gattgtaggc
     1261 tgcaactcgc ctacatgaag tcggaatcgc tagtaatcgc ggatcagcat gccgcggtga
     1321 atacgttccc gggccttgta cacaccgccc gtcacaccat gagagtttgt aacacccaaa
     1381 gtcgggggt actttagaac cgcccagagg agttt
```

## 8. *L. plantarum* F32

LOCUS GQ900604 1420 bp DNA linear BCT 12-OCT-2009
DEFINITION *Lactobacillus plantarum* strain F32 16S ribosomal RNA gene, partial sequence.
ACCESSION GQ900604
VERSION GQ900604.1 GI:260685295
KEYWORDS .
SOURCE *Lactobacillus plantarum*
ORGANISM *Lactobacillus plantarum*
Bacteria; Firmicutes; Lactobacillales; Lactobacillaceae; Lactobacillus.
REFERENCE 1 (bases 1 to 1420)
AUTHORS Auputinan,P. and Thongwai,N.
TITLE Distribution and Diversity of Plasmids in Lactobacilli Isolated from Fermented Foods
JOURNAL Unpublished
REFERENCE 2 (bases 1 to 1420)
AUTHORS Auputinan,P. and Thongwai,N.
TITLE Direct Submission
JOURNAL Submitted (10-SEP-2009) Department of Biology, Chiang Mai University, 239 Huaykaew Rd., Muang, Chiang Mai 50200, Thailand
FEATURES Location/Qualifiers
source 1..1420
/organism="*Lactobacillus plantarum*"
/mol_type="genomic DNA"
/strain="F32"
/db_xref="taxon:1590"
/PCR_primers="fwd_seq: tgcctaatacatgcaagt, rev_seq: cttgttacgacttcaccc"
rRNA <1..>1420
/product="16S ribosomal RNA"
ORIGIN

```
      1 ggcggatgtg ggcttgctat gatttacttt gagtgagtgg cgaactggtg agtaacacgt
     61 gggaaacctg cccagaagcg ggggataaca cctggaaaca gatgctaata ccgcataaca
    121 acttggaccg catggtccga gtttgaaaga tggcttcggc tatcactttt ggatggtccc
    181 gcggcgtatt agctagatgg tggggtaacg gctcaccatg gcaatgatac gtagccgacc
    241 tgagagggta atcggccaca ttgggactga gacacggccc aaactcctac gggaggcagc
    301 agtagggaat cttccacaat ggacgaaagt ctgatggagc aacgccgcgt gagtgaagaa
    361 gggtttcggc tcgtaaaact ctgttgttaa agaagaacat atctgagagt aactgttcag
    421 gtattgacgg tatttaacca gaaagccacg gctaactacg tgccagcagc cgcggtaata
    481 cgtaggtggc aagcgttgtc cggatttatt gggcgtaaag cgagcgcagg cggtttttta
    541 agtctgatgt gaaagccttc ggctcaaccg aagaagtgca tcggaaactg ggaaacttga
    601 gtccagaaaa gggccagtga acctccatgt gtagcgggga aaaggggtag atatatggaa
    661 gaacaccagt ggcgaagggg gctgttttga tctgtaactg acgctgaggc tcgaaagtat
    721 gggtagcaaa caggattaga taccctggta gtccataccg taaacgatga atgctaagtg
    781 ttggagggtt tccgcccttc agtgctgcag ctaacgcatt aagcattccg cctggggagt
    841 acggccgcaa ggctgaaact caaaggaatt gacgggggcc cgcacaagcg gtggagcatg
    901 tggtttaatt cgaagctacg cgaagaacct taccaggtct tgacatacta tgcaaatcta
    961 agagattaga cgttcccttc ggggacatgg atacaggtgg tgcatggttg tcgtcagctc
   1021 gtgtcgtgag atgttgggtt aagtcccgca acgagcgcaa cccttattat cagttgccag
   1081 cattaagttg ggcactctgg tgagactgcc ggtgacaaac cggaggaagg tggggatgac
   1141 gtcaaatcat catgcccctt atgacctggg ctacacacgt gctacaatgg atggtacaac
   1201 gagttgcgaa ctcgcgagag taagctaatc tcttaaagcc attctcagtt cggattgtag
   1261 gctgcaactc gcctacatga agtcggaatc gctagtaatc gcggatcagc atgccgcggt
   1321 gaatacgttc ccgggccttg tacacaccgc ccgtcacacc atgagagttt gtaacaccca
   1381 aagtcggtgg ggtaaccttt agaaccgccc taaggcagtt
```

## 9. *L. plantarum* F33

```
LOCUS       GQ900605       1423 bp    DNA     linear   BCT 12-OCT-2009
DEFINITION  Lactobacillus plantarum strain F33 16S ribosomal RNA gene,
partial sequence.
ACCESSION   GQ900605
VERSION     GQ900605.1  GI:260685296
KEYWORDS    .
SOURCE      Lactobacillus plantarum
  ORGANISM  Lactobacillus plantarum
            Bacteria; Firmicutes; Lactobacillales; Lactobacillaceae;
            Lactobacillus.
REFERENCE   1  (bases 1 to 1423)
  AUTHORS   Auputinan,P. and Thongwai,N.
  TITLE     Distribution and Diversity of Plasmids in Lactobacilli Isolated
            from Fermented Foods
  JOURNAL   Unpublished
REFERENCE   2  (bases 1 to 1423)
  AUTHORS   Auputinan,P. and Thongwai,N.
  TITLE     Direct Submission
  JOURNAL   Submitted (10-SEP-2009) Department of Biology, Chiang Mai
            University, 239 Huaykaew Rd., Muang, Chiang Mai 50200, Thailand
FEATURES             Location/Qualifiers
     source          1..1423
                     /organism="Lactobacillus plantarum"
                     /mol_type="genomic DNA"
                     /strain="F33"
                     /db_xref="taxon:1590"
                     /PCR_primers="fwd_seq: tgcctaatacatgcaagt, rev_seq:
                     cttgttacgacttcaccc"
     rRNA            <1..>1423
                     /product="16S ribosomal RNA"
ORIGIN
        1 ccagttgatg ggcttgctca tgatttactt tgagtgagtg gcgaactggt gagtaacacg
       61 tgggaaacct gcccagaagc gggggataac acctggaaac agatgctaat accgcataac
      121 aacttggacc gcatggtccg agtttgaaag atggcttcgg ctatcacttt tggatggtcc
      181 cgcggcgtat tagctagatg gtggggtaac ggctcaccat ggcaatgata cgtagccgac
      241 ctgagagggt aatcggccac attgggactg agacacggcc caaactccta cgggaggcag
      301 cagtagggaa tcttccacaa tggacgaaag tctgatggag caacgccgcg tgagtgaaga
      361 agggtttcgg ctcgtaaaac tctgttgtta aagaagaaca tatctgagag taactgttca
      421 ggtattgacg gtatttaacc agaaagccac ggctaactac gtgccagcag ccgcggtaat
      481 acgtaggtgg caagcgttgt ccggatttat tgggcgtaaa gcgagcgcag gcggtttttt
      541 aagtctgatg tgaaagcctt cggctcaacc gaagaagtgc atcggaaatt gggaaacttg
      601 agtgccggag gaggaccagt ggaactccat gtgtaagcgg tgaaatgggg aggttatatg
      661 gaagaacacc agtggcgaag cgggctgtct ggtctgtaac ggacgctgag gctggaaagt
      721 tatgggtagc aaacaggatt agataccgtg gtagtccata ccgtaaacga tgaatgctaa
      781 gtgttggagg gtttccgccc ttcagtgctg cagctaacgc attaagcatt ccgcctgggg
      841 agtacggccg caaggctgaa actcaaagga attgacgggg gcccgcacaa gcggtggagc
      901 atgtggttta attcgaagct acgcgaagaa ccttaccagg tcttgacata ctatgcaaat
      961 ctaagagatt agacgttccc ttcggggaca tggatacagg tggtgcatgg ttgtcgtcag
     1021 ctcgtgtcgt gagatgttgg gttaagtccc gcaacgagcg caacccttat tatcagttgc
     1081 cagcattaag ttgggcactc tggtgagact gccggtgaca aaccggagga aggtggggat
     1141 gacgtcaaat catcatgccc cttatgacct gggctacaca cgtgctacaa tggatggtac
     1201 aacgagttgc gaactcgcga gagtaagcta atctcttaaa gccattctca gttcggattg
     1261 taggctgcaa ctcgcctaca tgaagtcgga atcgctagta atcgcggatc agcatgccgc
     1321 ggtgaatacg ttcccgggcc ttgtacacac cgcccgtcac accatgagag tttgtaacac
     1381 ccaaagtcgg tggggaacct tttagaaccg ccctaaggca ctt
```

## 10. *L. plantarum* F34

LOCUS GQ900606 1418 bp DNA linear BCT 12-OCT-2009
DEFINITION *Lactobacillus plantarum* strain F34 16S ribosomal RNA gene, partial sequence.
ACCESSION GQ900606
VERSION GQ900606.1 GI:260685297
KEYWORDS .
SOURCE *Lactobacillus plantarum*
ORGANISM *Lactobacillus plantarum*
Bacteria; Firmicutes; Lactobacillales; Lactobacillaceae; Lactobacillus.
REFERENCE 1 (bases 1 to 1418)
AUTHORS Auputinan,P. and Thongwai,N.
TITLE Distribution and Diversity of Plasmids in Lactobacilli Isolated from Fermented Foods
JOURNAL Unpublished
REFERENCE 2 (bases 1 to 1418)
AUTHORS Auputinan,P. and Thongwai,N.
TITLE Direct Submission
JOURNAL Submitted (10-SEP-2009) Department of Biology, Chiang Mai University, 239 Huaykaew Rd., Muang, Chiang Mai 50200, Thailand
FEATURES Location/Qualifiers
source 1..1418
/organism="*Lactobacillus plantarum*"
/mol_type="genomic DNA"
/strain="F34"
/db_xref="taxon:1590"
/PCR_primers="fwd_seq: tgcctaatacatgcaagt, rev_seq: cttgttacgacttcaccc"
rRNA <1..>1418
/product="16S ribosomal RNA"
ORIGIN

```
      1 aaagcgttga tgggctgcac atgatttact ttgagtgagt ggcgaactgg tgagtaacac
     61 gtgggaaacc tgcccagaag cgggggataa cacctggaaa cagatgctaa taccgcataa
    121 caacttggac cgcatggtcc gagtttgaaa gatggcttcg gctatcactt ttggatggtc
    181 ccgcggcgta ttagctagat ggtggggtaa cggctcacca tggcaatgat acgtagccga
    241 cctgagaggg taatcggcca cattgggact gagacacggc ccaaactcct acgggaggca
    301 gcagtaggga atcttccaca atggacgaaa gtctgatgga gcaacgccgc gtgagtgaag
    361 aagggtttcg gctcgtaaaa ctctgttgtt aaagaagaac atatctgaga gtaactgttc
    421 aggtattgac ggtatttaac cagaaagcca cggctaacta cgtgccagca gccgcggtaa
    481 tacgtaggtg gcaagcgttg tccggattta ttgggcgtaa agcgagcgca ggcggttttt
    541 taagtctgat gtgaaagcct tcggctcaac cgaagaagtg catcggaaat ggggaaattt
    601 gagtgcggaa gaggacagtg gaactccatg tgtagcggtg aaatgcgtag atatatggaa
    661 gaacaccagt ggcgaaggcg gctgtctggt ctgtaactga cgctgaggct cgaaagtatg
    721 ggtagcaaac aggattagat accctggtag tccataccgt aaacgatgaa tgctaagtgt
    781 tggagggttt ccgcccttca gtgctgcagc taacgcatta agcattccgc ctggggagta
    841 cggccgcaag gctgaaactc aaaggaattg acgggggccc gcacaagcgg tggagcatgt
    901 ggtttaattc gaagctacgc gaagaacctt accaggtctt gacatactat gcaaatctaa
    961 gagattagac gttcccttcg gggacatgga tacaggtggt gcatggttgt cgtcagctcg
   1021 tgtcgtgaga tgttgggtta agtcccgcaa cgagcgcaac ccttattatc agttgccagc
   1081 attaagttgg gcactctggt gagactgccg gtgacaaacc ggaggaaggt ggggatgacg
   1141 tcaaatcatc atgcccctta tgacctgggc tacacacgtg ctacaatgga tggtacaacg
   1201 agttgcgaac tcgcgagagt aagctaatct cttaaagcca ttctcagttc ggattgtagg
   1261 ctgcaactcg cctacatgaa gtcggaatcg ctagtaatcg cggatcagca tgccgcggtg
   1321 aatacgttcc cgggccttgt acacaccgcc cgtcacacca tgagagtttg taacacccaa
   1381 agtcgggggt aacctttaga accgccctaa ggcaattt
```

## 11. *L. plantarum* F35

LOCUS GQ900607 1416 bp DNA linear BCT 12-OCT-2009
DEFINITION *Lactobacillus plantarum* strain F35 16S ribosomal RNA gene, partial sequence.
ACCESSION GQ900607
VERSION GQ900607.1 GI:260685298
KEYWORDS .
SOURCE *Lactobacillus plantarum*
ORGANISM *Lactobacillus plantarum*
Bacteria; Firmicutes; Lactobacillales; Lactobacillaceae; Lactobacillus.
REFERENCE 1 (bases 1 to 1416)
AUTHORS Auputinan,P. and Thongwai,N.
TITLE Distribution and Diversity of Plasmids in Lactobacilli Isolated from Fermented Foods
JOURNAL Unpublished
REFERENCE 2 (bases 1 to 1416)
AUTHORS Auputinan,P. and Thongwai,N.
TITLE Direct Submission
JOURNAL Submitted (10-SEP-2009) Department of Biology, Chiang Mai University, 239 Huaykaew Rd., Muang, Chiang Mai 50200, Thailand
FEATURES Location/Qualifiers
source 1..1416
/organism="*Lactobacillus plantarum*"
/mol_type="genomic DNA"
/strain="F35"
/db_xref="taxon:1590"
/PCR_primers="fwd_seq: tgcctaatacatgcaagt, rev_seq: cttgttacgacttcaccc"
rRNA <1..>1416
/product="16S ribosomal RNA"
ORIGIN

```
      1 aaagcgttga tgggcttgct ctgatttact ttgagtgagt ggcgaactgg tgagtaacac
     61 gtgggaaacc tgcccagaag cgggggataa cacctggaaa cagatgctaa taccgcataa
    121 caacttggac cgcatggtcc gagtttgaaa gatggcttcg gctatcactt ttggatggtc
    181 ccgcggcgta ttagctagat ggtggggtaa cggctcacca tggcaatgat acgtagccga
    241 cctgagaggg taatcggcca cattgggact gagacacggc ccaaactcct acgggaggca
    301 gcagtaggga atcttccaca atggacgaaa gtctgatgga gcaacgccgc gtgagtgaag
    361 aagggtttcg gctcgtaaaa ctctgttgtt aaagaagaac atatctgaga gtaactgttc
    421 aggtattgac ggtatttaac cagaaagcca cggctaacta cgtgccagca gccgcggtaa
    481 tacgtaggtg gcaagcgttg tccggattta ttgggcgtaa agcgagcgca ggcggttttt
    541 taagtctgat gtgaaagcct tcggctcaac cgaagaagtg catcggaaac tggaaactga
    601 ggtgcagaag aggacagtgg actcccatgt gtagcggtga aatgcgtaga tatatggaag
    661 aacaccagtg gcgaaggcgg ctgtctggtc tgtaactgac gctgaggctc gaaagtatgg
    721 gtagcaaaca ggattagata ccctggtagt ccataccgta aacgatgaat gctaagtgtt
    781 ggagggtttc cgcccttcag tgctgcagct aacgcattaa gcattccgcc tggggagtac
    841 ggccgcaagg ctgaaactca aaggaattga cgggggcccg cacaagcggt ggagcatgtg
    901 gtttaattcg aagctacgcg aagaacctta ccaggtcttg acatactatg caaatctaag
    961 agattagacg ttcccttcgg ggacatggat acaggtggtg catggttgtc gtcagctcgt
   1021 gtcgtgagat gttgggttaa gtcccgcaac gagcgcaacc cttattatca gttgccagca
   1081 ttaagttggg cactctggtg agactgccgg tgacaaaccg gaggaaggtg gggatgacgt
   1141 caaatcatca tgccccttat gacctgggct acacacgtgc tacaatggat ggtacaacga
   1201 gttgcgaact cgcgagagta agctaatctc ttaaagccat tctcagttcg gattgtaggc
   1261 tgcaactcgc ctacatgaag tcggaatcgc tagtaatcgc ggatcagcat gccgcggtga
   1321 atacgttccc gggccttgta cacaccgccc gtcacaccat gagagtttgt aacacccaaa
   1381 gtcggtgggg aaccttagaa ccgcgcagag gtattt
```

## 12. *L. brevis* G20

LOCUS GQ900608 1411 bp DNA linear BCT 12-OCT-2009
DEFINITION *Lactobacillus brevis* strain G20 16S ribosomal RNA gene, partial sequence.
ACCESSION GQ900608
VERSION GQ900608.1 GI:260685299
KEYWORDS .
SOURCE *Lactobacillus brevis*
ORGANISM *Lactobacillus brevis*
Bacteria; Firmicutes; Lactobacillales; Lactobacillaceae; Lactobacillus.
REFERENCE 1 (bases 1 to 1411)
AUTHORS Auputinan,P. and Thongwai,N.
TITLE Distribution and Diversity of Plasmids in Lactobacilli Isolated from Fermented Foods
JOURNAL Unpublished
REFERENCE 2 (bases 1 to 1411)
AUTHORS Auputinan,P. and Thongwai,N.
TITLE Direct Submission
JOURNAL Submitted (10-SEP-2009) Department of Biology, Chiang Mai University, 239 Huaykaew Rd., Muang, Chiang Mai 50200, Thailand
FEATURES Location/Qualifiers
source 1..1411
/organism="*Lactobacillus brevis*"
/mol_type="genomic DNA"
/strain="G20"
/db_xref="taxon:1580"
/PCR_primers="fwd_seq: tgcctaatacatgcaagt, rev_seq: cttgttacgacttcaccc"
rRNA <1..>1411
/product="16S ribosomal RNA"
ORIGIN

```
        1 atgacgtgct tgcactgatt tcaacaatga agcgagtggc gaactggtga gtaacacgtg
       61 ggaaatctgc ccagaagcag gggataacac ttggaaacag gtgctaatac cgtataacaa
      121 caaaatccgc atggattttg tttgaaaggt ggcttcggct atcacttctg gatgatcccg
      181 cggcgtatta gttagttggt gaggtaaagg cccaccaaga cgatgatacg tagccgacct
      241 gagagggtaa tcggccacat tgggactgag acacggccca aactcctacg ggaggcagca
      301 gtagggaatc ttccacaatg gacgaaagtc tgatggagca atgccgcgtg agtgaagaag
      361 ggtttcggct cgtaaaactc tgttgttaaa gaagagacac ctttgagagt aactgttcaa
      421 gggttgacgg tatttaacca gaaagccacg gctaactacg tgccagcagc cgcggtaata
      481 cgtaggtggc aagcgttgtc cgggatttat tgggcgtaaa gcgagcgcag gcggtttttt
      541 aagtctgatg tgaaagcctt cggcttaacc ggagaagtgc atcggaaact gggagacttg
      601 agtgcagaag aggacagtgg aactccatgt gtagcggtgg aatgcgtaga tatatggaag
      661 aacaccagtg gcgaaggcgg ctgtctagtc tgtaactgac gctgaggctc gaaagcatgg
      721 gtagcgaaca ggattagata ccctggtagt ccatgccgta aacgatgagt gctaagtgtt
      781 ggagggtttc cgcccttcag tgctgcagct aacgcattaa gcactccgcc tggggagtac
      841 gaccgcaagg ttgaaactca aaggaattga cgggggcccg cacaagcggt ggagcatgtg
      901 gtttaattcg aagctacgcg aagaacctta ccaggtcttg acatcttctg ccaatcttag
      961 agataagacg ttcccttcgg ggacagaatg acaggtggtg catggttgtc gtcagctcgt
     1021 gtcgtgagat gttgggttaa gtcccgcaac gagcgcaacc cttattatca gttgccagca
     1081 ttcagttggg cactctggtg agactgccgg tgacaaaccg gaggaaggtg gggatgacgt
     1141 caaatcatca tgcccccttat gacctgggct acacacgtgc tacaatggac ggtacaacga
     1201 gttgcgaagt cgtgaggcta agctaatctc ttaaagccgt tctcagttcg gattgtaggc
     1261 tgcaactcgc ctacatgaag ttggaatcgc tagtaatcgc ggatcagcat gccgcggtga
     1321 atacgttccc gggccttgta cacaccgccc gtcacaccat gagagtttgt aacacccaaa
     1381 gccggtgaga taaccttcgg gagtcagccg t
```

# APPENDIX D

## Nucleotide sequences and GenBank accession numbers of pSD11

LOCUS HQ622718 3225 bp DNA circular BCT 09-JAN-2011
DEFINITION *Lactobacillus brevis* strain D11 plasmid pSD11, complete sequence.
ACCESSION HQ622718
VERSION HQ622718.1 GI:316925166
KEYWORDS .
SOURCE *Lactobacillus brevis*
ORGANISM *Lactobacillus brevis*
Bacteria; Firmicutes; Lactobacillales; Lactobacillaceae; Lactobacillus.
REFERENCE 1 (bases 1 to 3225)
AUTHORS Auputinan,P., Pruksakorn,S., Tragoolpua,Y. and Thongwai,N.
TITLE Characterization of pSD11, a plasmid from *Lactobacillus brevis* D11
JOURNAL Unpublished
REFERENCE 2 (bases 1 to 3225)
AUTHORS Auputinan,P., Pruksakorn,S., Tragoolpua,Y. and Thongwai,N.
TITLE Direct Submission
JOURNAL Submitted (16-NOV-2010) Biology, Chiang Mai University, 239 Huaykaew Rd., Muang, Chiang Mai 50200, Thailand
FEATURES Location/Qualifiers
source 1..3225
/organism="*Lactobacillus brevis*"
/mol_type="genomic DNA"
/strain="D11"
/isolation_source="fermented food"
/db_xref="taxon:1580"
/plasmid="pSD11"
/country="Thailand"
gene 714..1340
/gene="rep"
CDS 714..1340
/gene="rep"
/codon_start=1
/transl_table=11
/product="replication protein"
/protein_id="ADU57956.1"
/db_xref="GI:316925168"

/translation="MLHYKKAHRVKECGEVLRFVEDKNGHKKLAQTWFCHSRLCPLCN

WRRSMKQSNQLTQILTEAVKQRKTGRFLFLTLTVENTTGDLLKSELRQMGRAIAKIFQ

YKKVAKNLLGYVRSTEVTINHEADQPMYHHHMHVLLFMKSSYFTGTDNYISQTEWTRY

WQRAMKLAYVPVVNVEAVKPNVKRQKNSLLASAQETAKYPGEVQRYFN"

gene 2140..3225
/gene="mob"
CDS 2140..3225
/gene="mob"
/codon_start=1
/transl_table=11

/product="mobilization protein"
/protein_id="ADU57955.1"

/db_xref="GI:316925167"

/translation="MSYLVANMQKLKADNLVGLGNHDQRRTRHHKNTDIDVDRSDLNY

DLVAGRTNHFKTDIEAYINEHKTSQRAVRKDAVLVNEWIISSDSNFFANLTAADTRKY

FETAKAYFAEKFGEENIRYAIVHLDESTPHMHMGIVPFDDEYKLSAKRVFNRAALQNV

QDQLPVYLRQRGFAVERGIQESQHKSLTVPEYKAMREDLKKATLQKREIQAELEDARK

HLAELKPRDQQEIESKPTFLSKDKVVVRKSDLHDLESRAAVSDIYNQQQNRLKLDNQS

LNYQLLEVKDNNYDLSKKNEKLQKLVDTLQGIVRSVDRFLQRKLGVGLPNEWLERAGL

KEPSKKAPQRPQERSEGQHDELDGPSL"

ORIGIN

```
      1 atttggtcta tggctttaat ttaaccgctg atgagtattg gagctgttta atggccgtca
     61 gtcaacggta aatcgaatta aagggactta ctgctttagc agttagtccc tttttgaggc
    121 tttaaggagt tgattgacta accaaaccca gacactgaat tggctgaaag ccaaagtttc
    181 ctaaactttg ctttcctgcc tcacggcgag tgcggggtga gtttgagcgg gagctcccgc
    241 tcatttatgc ggtcaagctg gcacagcttg gactgggttc ggggcgtcag cgcccgaggg
    301 cttagaaact ggtcgatttt gaccagtttc ttcttatctt gatactatta gaaacaacgt
    361 cattttaaaa aaccgggata aacccgtgac ccaactgggc ttaggcgtat tatgagttta
    421 taaaatgaat aaagaaaaaa cccacgtgag aattcctagt ttggcgaccc ggaacacgtg
    481 agttatcttg aatattcgta tttactagac atagtttaaa gcttgagtta gcaagcgtca
    541 agcccttggc tttagtaaat acataaaaga ttagctcttc tcacgtggct gaatgagggg
    601 agctttttag tttggctgat agaaaagttt tagttgatcg atcgcagtcg ggcaaagtac
    661 gaccatggcg agaacataag ttagaaaatt tacagtatgg tgattattta caaatgttgc
    721 actacaagaa agcccatcga gttaaagagt gtggtgaagt attacgtttt gtggaagata
    781 aaaatggtca caaaaaactg gctcagactt ggttttgcca ttcccgtttg tgtccgttat
    841 gtaattggcg acggtcaatg aaacaatcta accagttaac tcaaattttg acagaagcag
    901 ttaaacagcg aaaaacgggt cggttcttgt ttttaacatt gacggtagag aatactacag
    961 gggatttgtt gaagagtgaa ttacggcaga tgggacgagc tattgcaaag atctttcagt
   1021 ataaaaaagt ggctaaaaat ttgttgggct atgtacgttc aactgaggtt accattaatc
   1081 acgaagcgga tcagccgatg tatcaccacc atatgcatgt tttgcttttt atgaaatcta
   1141 gttatttttac aggaactgat aattatattt cacaaacaga atggactaga tattggcaac
   1201 gagcgatgaa attagcttat gtgccggttg tgaatgttga agcggttaaa ccgaatgtga
   1261 aacgccagaa aaattcttta ctggctagtg cccaagaaac ggctaagtat ccaggtgaag
   1321 tccaaagata ttttaactaa taatcaagaa caagatttac aagtaattga tgatttggaa
   1381 caagctttgg ctggttcccg gcaaattagc tatgggggtt tgctgaaaga aattcgcaag
   1441 cagttgcaat tagaagacgt tgaaaatggc gatttgatta atacggatag taatgatcaa
   1501 gaaactgatc aagtagtgcg tgaaattgtt gctaaatggg actatcagcg taaaaattac
   1561 tttatttaaa tgagtgctat attatatata aagacaggaa atcatttgtc tagcaaggag
   1621 cctttttttat gatttatgct gtagctgttt cttttcaaag tagtcaagaa agtgaatgga
   1681 catggaaaag tgtcgatcag atttatttaa attccgatga ttcttctgta ctttctggtt
   1741 ggcatagtaa ggcctatgtg tatgatctta ttaagaataa ggggaaaata gttaaagtct
   1801 atatctctcc ttatcctaaa ttgattcctg aaatttacga tggaagtact aaatttgttc
   1861 gttctgagaa tgatgatact tctactgata atttggttca acttggtaga aaagcaagta
   1921 attataaata aattttgagt atttgtatca aagtaaatgt tttagataat cattgggagc
   1981 taaagcgacc tttgattatt tttttgccaa cggcgaaaac agcctcgcag agcccaaact
   2041 ttacaaggta aagtatattg ggctatacct tgcatggagg tttgccgaat tctgtgctat
   2101 gctctaacca aatttagctg tttggaatgg agtggtgaaa tgagttattt agtggctaat
   2161 atgcagaaat taaaagctga taatttagtt ggcttgggta atcatgatca acgccgaacg
   2221 cgacatcaca aaaatactga tattgacgtt gaccgttctg acttaaatta tgatttagtt
   2281 gctggtcgga ctaaccattt caaaacggat attgaggctt atattaacga acataaaacc
   2341 agtcagagag cggtcagaaa agatgccgtt ttagtcaatg aatggattat ttcgagcgat
   2401 agcaatttct ttgctaattt aacggcggct gatacccgca aatattttga aacagctaaa
   2461 gcttactttg ctgaaaaatt tggtgaagaa aacattcgtt atgcgattgt tcatcttgat
```

```
2521 gagagtactc cccatatgca tatgggaatt gttccatttg atgatgagta taaattatcg
2581 gctaaacggg tgtttaatcg tgcggctttg caaaacgttc aagatcaatt gccagtttat
2641 ttacgacaac gcggatttgc tgttgaacgt ggtattcaag aatcgcaaca taaaagttta
2701 acggtaccag aatacaaagc tatgcgggaa gatttgaaaa aggcgacgct tcaaaaacga
2761 gaaatacaag ctgaacttga agatgccaga aaacaccttg ctgaacttaa acctcgtgat
2821 cagcaggaaa ttgagagcaa acctactttt ttaagcaagg ataaagtggt tgttagaaaa
2881 agtgatcttc atgacttaga atctcgagca gctgtcagtg atatttataa tcaacaacag
2941 aaccgtttaa aacttgataa tcaaagccta aattatcaac tgcttgaagt taaagacaat
3001 aattatgatt taagcaagaa aaatgagaag ctccaaaaat tagtggatac gttacaagga
3061 attgttcgga gcgttgaccg gttcttacag cgcaaattag gtgttggctt accaaatgag
3121 tggctagagc gagctggact aaaagaaccg tctaaaaaag cccctcagag gccacaagag
3181 cgttcggagg gacaacatga tgaattagat ggtccaagcc tttga
```

## APPENDIX E

**Biochemical tests of 105 *Lactobacillus* spp. isolated from fermented foods**

| Isolate | Growth (°C) 15/45 | Catalase test | Motility test | Gas production | Carbohydrates Fermentation | | | | | | | | | | | | | | | | | | | | | | | Species |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Amygdalin | Arabinose | Cellobiose | Esculin | Fructose | Galactose | Glucose | Gluconate | Lactose | Maltose | Mannitol | Mannose | Melezitose | Melibiose | Raffinose | Rhamnose | Ribose | Salicin | Sorbitol | Sucrose | Trehalose | Xylose | |
| A1 | +/+ | - | - | + | - | + | - | - | + | + | + | + | + | + | + | + | - | + | + | - | + | - | - | + | + | + | Other lactobacilli |
| A4 | +/+ | - | - | + | - | + | - | - | + | + | + | + | + | + | + | + | - | + | + | - | + | - | - | + | + | + | Other lactobacilli |
| A5 | +/+ | - | - | + | - | + | - | - | + | + | + | + | + | + | + | + | - | + | + | - | + | - | - | + | + | + | Other lactobacilli |
| A9 | +/+ | - | - | + | - | + | - | - | + | + | + | + | - | + | + | - | - | + | - | - | + | + | - | - | - | + | *L. collinoides* |
| A15 | +/- | - | - | - | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | *L. plantarum* |
| D11 | +/- | - | - | + | - | + | - | + | + | - | + | + | - | + | - | - | - | + | - | - | + | - | - | - | - | + | *L. brevis* |
| D1-2 | +/+ | - | - | - | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | *L. plantarum* |
| D13 | +/- | - | - | + | - | + | - | + | + | - | + | + | - | + | - | - | - | + | - | - | + | - | - | - | - | + | *L. brevis* |
| D2 | +/+ | - | - | - | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | *L. plantarum* |
| D3-1 | +/- | - | - | + | - | + | - | - | + | + | + | + | - | + | - | - | - | - | - | - | + | - | - | - | - | + | *L. brevis* |
| D4-1 | +/- | - | - | + | - | + | - | - | + | + | + | + | - | + | - | - | - | - | - | - | - | - | - | - | - | + | *L. brevis* |
| D5 | +/+ | - | - | - | + | + | + | + | + | + | + | + | + | + | + | + | + | + | - | - | + | + | + | + | + | - | *L. plantarum* |
| D7-2 | +/+ | - | - | - | + | - | + | + | + | + | + | + | + | + | + | + | + | + | + | - | + | + | + | + | + | - | *L. plantarum* |
| D8-2 | +/+ | - | - | - | + | - | + | + | + | + | + | + | + | + | + | + | + | + | + | - | + | + | + | + | + | - | *L. plantarum* |
| D10 | +/+ | - | - | + | - | - | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | - | - | *L. fermentum* |
| D16 | +/- | - | - | - | + | - | + | + | + | + | + | + | + | + | + | + | + | + | + | - | + | + | + | + | + | - | *L. plantarum* |
| D18 | +/- | - | - | - | + | - | + | + | + | + | + | - | + | + | + | + | + | + | + | - | + | + | + | + | + | - | *L. plantarum* |

| Isolate | Growth (°C) 15/45 | Catalase test | Motility test | Gas production | Carbohydrates Fermentation | | | | | | | | | | | | | | | | | | | | | | | Species |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Amygdalin | Arabinose | Cellobiose | Esculin | Fructose | Galactose | Glucose | Gluconate | Lactose | Maltose | Mannitol | Mannose | Melezitose | Melibiose | Raffinose | Rhamnose | Ribose | Salicin | Sorbitol | Sucrose | Trehalose | Xylose | |
| D20 | +/- | - | - | + | - | + | - | - | + | + | + | + | - | + | - | - | - | - | - | - | + | - | - | - | - | + | *L. brevis* |
| E6 | +/- | - | - | + | - | + | + | + | + | + | + | + | - | + | - | + | + | + | - | - | + | + | + | - | - | + | *L. brevis* |
| E20 | +/+ | - | - | - | + | + | + | + | + | + | + | + | + | + | - | + | - | - | - | - | + | + | - | - | - | + | *L. fermentum* |
| E36 | +/- | - | - | + | - | + | - | - | + | - | + | + | - | + | - | - | - | + | - | - | + | - | - | - | - | + | *L. brevis* |
| E37 | +/- | - | - | + | - | + | - | - | + | - | + | + | - | + | - | - | - | + | - | - | + | - | - | - | - | + | *L. brevis* |
| F3 | +/+ | - | - | + | - | + | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | - | + | *L. fermentum* |
| F4 | +/+ | - | - | + | - | + | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | - | + | *L. fermentum* |
| F5 | +/+ | - | - | + | - | - | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | - | - | *L. fermentum* |
| F7 | +/+ | - | - | + | - | - | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | - | - | *L. fermentum* |
| F8 | +/+ | - | - | + | - | - | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | - | - | *L. fermentum* |
| F9 | +/+ | - | - | + | - | + | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | + | + | *L. fermentum* |
| F10 | +/+ | - | - | + | - | + | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | + | + | *L. fermentum* |
| F14 | +/+ | - | - | + | - | - | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | - | - | *L. fermentum* |
| F15 | +/+ | - | - | + | - | - | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | - | - | *L. fermentum* |
| F16 | +/+ | - | - | + | - | - | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | - | - | *L. fermentum* |
| F17 | +/+ | - | - | + | - | - | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | - | - | *L. fermentum* |
| F19 | +/+ | - | - | + | - | - | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | - | - | *L. fermentum* |

| Isolate | Growth (°C) 15/45 | Catalase test | Motility test | Gas production | Carbohydrates Fermentation | | | | | | | | | | | | | | | | | | | | | | | Species |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Amygdalin | Arabinose | Cellobiose | Esculin | Fructose | Galactose | Glucose | Gluconate | Lactose | Maltose | Mannitol | Mannose | Melezitose | Melibiose | Raffinose | Rhamnose | Ribose | Salicin | Sorbitol | Sucrose | Trehalose | Xylose | |
| F21 | +/+ | - | - | + | - | - | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | + | + | *L. fermentum* |
| F22 | +/+ | - | - | + | - | + | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | + | + | *L. fermentum* |
| F23 | +/+ | - | - | + | - | - | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | + | + | *L. fermentum* |
| F24 | +/+ | - | - | + | - | + | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | + | + | *L. fermentum* |
| F30 | +/+ | - | - | - | + | - | + | + | + | + | + | - | + | + | - | + | - | - | - | - | + | + | - | + | + | - | Other lactobacilli |
| F31 | +/- | - | - | - | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | - | + | + | + | + | + | + | *L. plantarum* |
| F32 | +/- | - | - | - | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | - | + | + | + | + | + | + | *L. plantarum* |
| F33 | +/- | - | - | - | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | - | + | + | + | + | + | + | *L. plantarum* |
| F34 | +/- | - | - | - | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | - | + | + | + | + | + | + | *L. plantarum* |
| F35 | +/- | - | - | - | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | - | + | + | + | + | + | + | *L. plantarum* |
| G3 | +/+ | - | - | + | - | - | - | - | + | - | + | + | - | + | + | + | - | - | - | - | + | - | - | + | + | - | *L. halotolerans* |
| G4 | +/+ | - | - | + | - | - | - | - | + | - | + | + | - | + | + | + | - | - | - | - | + | - | - | + | + | - | *L. halotolerans* |
| G7 | +/- | - | - | - | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | *L. plantarum* |
| G8 | +/+ | - | - | - | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | *L. plantarum* |
| G9 | +/- | - | - | - | + | - | + | + | + | + | + | + | + | + | + | + | + | + | + | - | + | + | + | + | + | - | *L. plantarum* |
| G10 | -/+ | - | - | - | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | *L. plantarum* |
| G11 | +/+ | - | - | - | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | *L. plantarum* |
| G12 | +/- | - | - | - | - | - | + | - | + | + | + | - | + | + | - | + | + | + | + | + | + | + | - | - | + | + | *L. homohiochii* |

| Isolate | Growth (°C) 15/45 | Catalase test | Motility test | Gas production | Carbohydrates Fermentation | | | | | | | | | | | | | | | | | | | | | | | Species |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Amygdalin | Arabinose | Cellobiose | Esculin | Fructose | Galactose | Glucose | Gluconate | Lactose | Maltose | Mannitol | Mannose | Melezitose | Melibiose | Raffinose | Rhamnose | Ribose | Salicin | Sorbitol | Sucrose | Trehalose | Xylose | |
| G15 | +/+ | - | - | + | - | + | + | + | + | + | + | + | + | + | + | - | - | - | - | - | + | + | - | - | - | + | Other lactobacilli |
| G16 | -/+ | - | - | + | - | + | - | - | + | + | + | + | - | + | - | - | - | + | + | - | + | - | - | + | + | - | *L. brevis* |
| G17 | +/+ | - | - | + | - | + | + | - | + | + | + | + | + | + | + | - | - | + | - | - | + | + | - | + | - | + | *L. brevis* |
| G20 | +/+ | - | - | + | - | + | - | - | + | + | + | + | - | + | - | - | - | - | - | - | + | + | - | - | - | + | *L. brevis* |
| G22 | +/+ | - | - | - | + | - | + | + | + | + | + | - | + | + | - | + | - | - | - | - | + | + | - | + | + | - | Other lactobacilli |
| G24 | +/+ | - | - | + | - | - | - | - | + | - | + | + | - | + | + | + | - | - | - | - | + | - | - | + | + | + | *L. halotolerans* |
| G25 | +/+ | - | - | + | - | + | - | - | + | + | + | + | - | + | + | - | - | + | - | - | + | + | - | - | - | + | *L. brevis* |
| X1 | +/+ | - | - | + | - | + | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | + | + | *L. fermentum* |
| X2 | +/+ | - | - | + | - | + | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | + | + | *L. fermentum* |
| X3 | +/+ | - | - | + | - | + | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | + | + | *L. fermentum* |
| X4 | -/+ | - | - | + | - | - | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | - | + | *L. fermentum* |
| X6-1 | -/- | - | - | - | + | - | + | + | + | - | + | - | - | + | - | + | - | - | - | - | - | + | - | + | + | - | Other lactobacilli |
| X6-2 | +/+ | - | - | + | - | + | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | + | + | *L. fermentum* |
| X9 | -/- | - | - | - | + | - | + | + | + | - | + | - | - | + | - | + | - | - | - | - | + | + | - | + | + | - | Other lactobacilli |
| X26 | +/- | - | - | + | - | + | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | + | + | *L. fermentum* |
| X27 | +/+ | - | - | + | - | + | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | + | + | *L. fermentum* |
| X30 | +/- | - | - | + | - | + | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | + | + | *L. fermentum* |

| Isolate | Growth (°C) 15/45 | Catalase test | Motility test | Gas production | Carbohydrates Fermentation | | | | | | | | | | | | | | | | | | | | | | | Species |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Amygdalin | Arabinose | Cellobiose | Esculin | Fructose | Galactose | Glucose | Gluconate | Lactose | Maltose | Mannitol | Mannose | Melezitose | Melibiose | Raffinose | Rhamnose | Ribose | Salicin | Sorbitol | Sucrose | Trehalose | Xylose | |
| X31 | +/- | - | - | + | - | + | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | + | + | *L. fermentum* |
| X34 | +/- | - | - | + | - | + | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | + | + | *L. fermentum* |
| X35 | +/- | - | - | + | - | + | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | + | + | *L. fermentum* |
| X36 | +/- | - | - | + | - | + | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | + | + | *L. fermentum* |
| X37 | +/- | - | - | + | - | + | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | + | + | *L. fermentum* |
| X38 | +/+ | - | - | + | - | + | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | + | + | *L. fermentum* |
| X45 | +/- | - | - | + | - | + | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | + | + | *L. fermentum* |
| T1 | +/- | - | - | - | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | *L. plantarum* |
| T2 | +/- | - | - | + | - | + | - | - | + | + | + | + | - | + | + | - | - | + | - | - | + | - | - | + | - | + | *L. brevis* |
| T3 | +/- | - | - | - | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | - | + | + | + | + | + | + | *L. plantarum* |
| T4 | +/- | - | - | + | - | + | + | - | + | + | + | + | - | + | + | - | - | + | - | - | + | + | - | + | - | + | Other lactobacilli |
| T5 | -/- | - | - | + | - | + | + | - | + | + | + | + | - | + | - | - | - | + | - | - | + | + | - | + | - | + | Other lactobacilli |
| T6 | +/- | - | - | + | - | + | - | - | + | + | + | + | - | + | + | - | - | + | - | - | + | + | - | + | - | + | Other lactobacilli |
| T7 | +/- | - | - | - | + | - | + | + | + | + | + | + | + | + | + | + | + | + | + | - | + | + | + | + | + | - | *L. plantarum* |
| T8 | +/- | - | - | - | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | - | *L. plantarum* |
| T9 | +/- | - | - | - | - | - | + | + | + | + | + | + | + | + | + | + | + | - | - | - | + | + | + | + | + | - | Other lactobacilli |
| T10 | +/- | - | - | - | - | - | + | + | + | + | + | + | + | + | + | + | + | - | - | - | + | + | + | + | + | - | Other lactobacilli |

| Isolate | Growth (°C) 15/45 | Catalase test | Motility test | Gas production | Carbohydrates Fermentation | | | | | | | | | | | | | | | | | | | | | | | Species |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Amygdalin | Arabinose | Cellobiose | Esculin | Fructose | Galactose | Glucose | Gluconate | Lactose | Maltose | Mannitol | Mannose | Melezitose | Melibiose | Raffinose | Rhamnose | Ribose | Salicin | Sorbitol | Sucrose | Trehalose | Xylose | |
| T11 | +/+ | - | - | + | - | + | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | + | + | *L. brevis* |
| T12 | +/+ | - | - | + | - | + | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | + | + | *L. brevis* |
| T13 | +/- | - | - | + | - | + | - | - | + | + | + | + | - | + | - | - | - | + | - | - | + | - | - | + | - | + | *L. brevis* |
| T14 | +/+ | - | - | + | - | + | - | - | + | + | + | + | - | + | - | - | - | + | - | - | + | - | - | + | - | + | *L. brevis* |
| T15 | +/- | - | - | + | - | + | + | - | + | + | + | + | - | + | + | - | - | + | - | - | + | + | - | + | - | + | Other lactobacilli |
| T16 | +/- | - | - | + | - | + | + | + | + | + | + | + | - | + | + | - | - | + | - | - | + | + | - | + | - | + | Other lactobacilli |
| T17 | +/+ | - | - | + | - | + | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | + | + | *L. brevis* |
| T18 | +/- | - | - | - | - | - | + | + | + | + | + | + | + | + | + | + | + | - | - | - | + | + | - | - | + | - | Other lactobacilli |
| T19 | +/- | - | - | + | - | + | + | - | + | + | + | + | - | + | + | - | - | + | - | - | + | + | - | + | - | + | Other lactobacilli |
| Y1 | +/- | - | - | + | - | + | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | + | + | *L. fermentum* |
| Y2 | +/- | - | - | - | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | - | + | + | + | + | + | + | *L. plantarum* |
| Y3 | +/- | - | - | + | - | + | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | + | + | *L. fermentum* |
| Y4 | +/- | - | - | + | - | + | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | + | + | *L. fermentum* |
| Y5 | +/- | - | - | + | - | + | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | + | + | *L. fermentum* |
| Y6 | +/- | - | - | - | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | - | + | + | + | + | + | + | *L. plantarum* |
| Y7 | +/- | - | - | + | - | + | - | - | + | + | + | + | + | + | - | + | - | + | + | - | + | - | - | + | + | + | *L. fermentum* |
| Y8 | +/- | - | - | - | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + | - | + | + | + | + | + | + | *L. plantarum* |

| Isolate | Growth (°C) 15/45 | Catalase test | Motility test | Gas production | Carbohydrates Fermentation | | | | | | | | | | | | | | | | | | | | | | | Species |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Amygdalin | Arabinose | Cellobiose | Esculin | Fructose | Galactose | Glucose | Gluconate | Lactose | Maltose | Mannitol | Mannose | Melezitose | Melibiose | Raffinose | Rhamnose | Ribose | Salicin | Sorbitol | Sucrose | Trehalose | Xylose | |
| Y11 | +/- | - | - | + | - | + | - | - | + | + | + | + | - | + | - | - | - | + | - | - | + | - | - | + | - | + | *L. brevis* |
| Y12 | +/- | - | - | + | - | + | - | - | + | + | + | + | - | + | - | - | - | + | - | - | + | - | - | + | - | + | *L. brevis* |

# CURRICULUM VITAE

**Name** Ms. Panitnart Auputinan

**Date of Birth** 10 February 1981

**Education Background**

2002 Bachelor of Science (Microbiology)
Department of Biology, Faculty of Science, Chiang Mai University

**Publications**

1. Auputinan, P., Tragoolpua, Y., Pruksakorn, S. and Thongwai, N. 2010. Detection of plasmids from *Lactobacillus* spp. isolated from fermented foods. *KKU Research Journal.* 15(9): 863-869.
2. Auputinan, P., Tragoolpua, Y., Pruksakorn, S. and Thongwai, N. 2010. Profiles of plasmids in lactobacilli isolated from fermented foods. *Chiang Mai Journal of Science*. (In Press).

**Acadamic activities**

1. Oral presentation in the topic "Detection and Partial characterization of *Lactobacillus* spp. Plasmids". The 3rd International Conference on Fermentation Technology for Value Added Agricultural Products with Joint Sessions from JSPS-NRCT Asian Core Program and The 7th Conference on Lactic Acid Bacteria in Thai Food and Feed Industries (FerVAAP 2009), Khon Kaen, Thailand. August 26-28, 2009.

2. Poster presentation in the topic "Substrates Utilization of *Lactobacillus* spp. containing Plasmids". The 21st Annual Meeting and International Conference of The Thai Society for Biotechnology (TSB 2009), Bangkok, Thailand. September 24-25, 2009.
3. Poster presentation in the topic "Antibiotic Susceptibility of Plasmid Containining *Lactobacillus* spp. Isolated from Fermented Foods". 2011 International Conference on Bioscience, Biochemistry and Bioinformatics (ICBBB 2011), Singapore, February 26-28, 2011.