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APPENDICES

APPENDIX A

Instruments, materials, chemical reagents and glassware

1. Instruments and materials

- Analytical balance: Mettler Toledo model AG204, Switzerland.
- Autoclave: Tomy model SS-325, Japan.
- Centrifuges: Beckman model Avanti J25, U.S.A; Eppendorf model 5430, Germany; Sorvall model RC-5C Plus and Sorvall tabletop centrifuge model RC-5C Plus, USA.
- Circulating Water Bath: Techre model TE8 A, UK.
- Freeze Dryer: Savant model Super Modulya 233, USA.
- Hot plate and stirrer: Thermolyne model Crimarec2, USA.
- Incubator: Memmert model BE500(30°C, 37°C, 45°C, 50°C, and 55°C), Germany.
- Incubator shaker: New Brunswick Scientific model innova4300, U.S.A
- Magnetic stirrer: Ika model RO-10, Malaysia.
- Microwave: Sanyo model EM-815FW, Japan.
- Oven: Memmert UE 600, Germany.
- pH Meter: Mettler Toledo model CH-8603, Switzerland.
- Pipetteman: Gilson, Villiers-Le-Bel, France.
- Precision balance: Mettler Toledo model PB3002, Switzerland.
- Freezer : Sharp model FC27 (-20°C), Japan and Deep Freezer REVCO model ULT1790-7-V12 (-80°C), USA.
- Shaking Water Bath: Memmert, model WB22, Germany.
- Spectrophotometer: Sherwood Scientific model259, Cambridge, UK.
- Vortex mixer: Barnstead/Thermolyne model M37610-26, Iowa, USA.

2. Chemicals

Chemical	**Company**	**Grade**
Acetone	Merck	Analytical
Bovine serum albumin	Sigma	Analytical
Chloroform	Mallinckrodt	Analytical
Ethanol	Carlo Erba	Analytical
Ethylene diamine tetraacetic acid (EDTA)	Merck	Analytical
Ferric sulfate sevenhydrate	Carlo Erba	Analytical
Folin-Ciocalteu's phenol	Merck	Analytical
Hydrochloric acid	Merck	Analytical
Magnesium sulfate heptahydrate	Sigma	Analytical
Methanol	Merck	Analytical
Phenol	Carlo Erba	Analytical
Potassium hydrogen sulfate	Merck	Analytical
Di-potassium tartate	Carlo Erba	Analytical
Sodium chloride	Carlo Erba	Analytical
Tri-sodium citrate dihydrate	Merck	Analytical
Sodium dodecyl sulfate	Fluka	Analytical
Sodium hydroxide	Merck	Analytical
Sodium potassium tartate	Merck	Analytical
Trichloroacetic acid	Merck	Analytical
Trisma base	Merck	Analytical
Tyrosine	Sigma	Analytical
Xylose	Merck	Analytical

3. Glassware

- Culture tube 16x150 mm : Pyrex, U.S.A.
- Culture tube 25x250 mm : Pyrex, U.S.A.
- Petri-dish 90 mm: Millionant, SA.54, France.

APPENDIX B

Culture Media

1. Enrichment Media

1) Glucose-Ethanol medium

Glucose	1.5%
Ethanol	0.5%
Peptone	0.3%
Yeast Extract	0.3%
Acetic acid	0.35%

Adjust pH 3.5 with HCl

2) Sorbitol medium

Sorbitol	2.0%
Peptone	0.3%
Yeast extract	0.3%

Adjust pH 3.5 with HCl

3) Sucrose-Acetic acid medium

Sucrose	2.0%
Peptone	0.3%
Yeast extract	0.3%
Acetic acid	0.35%

Adjust pH 3.5 with HCl

4) Methanol-Peptone-Yeast extract (MPY) medium

Methanol	0.8% (added after autoclaving)
Peptone	0.3%
Yeast extract	0.3%

Adjust pH 4.0 with HCl

2. Glucose-Ethanol-Yeast extract-$CaCO_3$ (GEY- $CaCO_3$) agar plate

Glucose	2.0%
Ethanol	0.5%
Peptone	0.3%
Yeast Extract	0.3%
$CaCO_3$	0.7%
Agar	1.5%

3. Cryoprotectant for preservation

Glucose	2.5%
Glycerol	20%
Peptone	0.5%
Yeast Extract	0.3%

4. Growth in test media (4 kinds)

4.1 Glucose-ethanol with 0.3% acetic acid medium

Glucose	1.5%
Ethanol	0.5%
Peptone	0.3%
Yeast Extract	0.3%
Acetic acid	0.3%

Adjust pH 3.5 with HCl

4.2 Glucose-ethanol without acetic acid medium

Glucose	1.5%
Ethanol	0.5%
Peptone	0.3%
Yeast Extract	0.3%

Adjust pH 3.5 with HCl

4.3 Sorbitol medium

Sorbitol	2.0%
Peptone	0.3%
Yeast extract	0.3%

Adjust pH 3.5 with HCl

4.4 Sucrose with 0.3% acetic acid medium

Sucrose	2.0%
Peptone	0.3%
Yeast extract	0.3%
Acetic acid	0.3%

Adjust pH 3.5 with HCl

5. Oxidation/fermentation medium

Glucose	10%
Peptone	2.0%
NaCl	5%
K_2HPO_4	0.3%
Bromthymol blue	0.03%
Agar	3%

Adjust pH 7.1, autoclave at 110°C, 10 min

6. Acetate/Lactate medium

Peptone	0.2%
Yeast extract	0.2%
Sodium acetate/lactate	0.2%
Bromthymol blue	0.002%

7. Acid production medium

Yeast extract	2.5%
Bromocresol purple	0.2%
Carbon source	1.0%

8. Glucose-Glycerol-Yeast extract Potato (GGYP) medium

Potato	10%
Glucose	0.5%
Glycerol	1.0%
Yeast extract	1.0%
Peptone	1.0%

9. Glucose-Glycerol-Yeast extract (GGY) medium

Glucose	2.0%
Glycerol	1.0%
Yeast extract	0.5%
Agar	1.5%

APPENDIX C

Reagents and Buffers

1. Determination of protein

The protein content was measured by the method of Lowry *et al.* (1951) with bovine serum albumin as standard.

1.1 Reagents

A: 2% sodium carbonate in 0.1N NaOH

B: 0.5% $CuSO_4.5H_2O$ in 1% sodium citrate

C: 1 N Folin-Ciocalteu's phenol reagent

(2N Folin Phenol was diluted with distilled water to the final concentration in 1N, the solution should be freshly prepared before use.)

D: 1 ml Reagent B + 50 ml Reagent A (or similar ratio), Make up immediately before use.

1.2 Procedure

1. Place 0.1 ml of proper dilution of culture broth (for protein determination) or clear supernatant of reaction mixture (for soluble peptide determination)

2. Add 1 ml of Reagent D into the tube and vortex immediately. Incubate at room temperature for 10 min.

3. After the 10 min incubation, add 0.1 ml of Reagent C to sample and vortex immediately. Incubate 30 min at room temperature.

4. Absorbance (OD) of samples was measured at 750 nm. Concentrations of the samples were compared to the standard curve for determination of values. Distilled water was used instead of sample as a blank.

1.3 Preparation of standard curve of protein

Standards of 0, 0.1, 0.2, 0.3, 0.5, 0.7 and 1.0 mg/ml were prepared from bovine serum albumin. The reactions were carried out with the same procedure as described previously. Absorbances were plotted against concentrations of standards.

2. Reducing sugar

Standards of 0, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9 and 1.0 μg/ml were prepared from xylose. The reaction were carried out with the same procedure as described by Somogyi and Nelson method (1952).

3. 6 N HCl

Conc. HCl	60	ml
Distiller water	60	ml

Add conc. HCl into the distilled water.

4. 2 N H_2SO_4

Conc. H_2SO_4	2	ml
Distilled water	34	ml

Add conc. H_2SO_4 into the distilled water.

5. Phenol:Chloroform (1:1 v/v)

Crystalline phenol was liquidified in water bath at 65°C and mixed with chloroform in the ratio of 1:1 (v/v). The solution was stored in a light tight bottle.

6. 0.5M EDTA (pH 8.0)

800 ml of distilled water, 186.1 g of disodium ethylenediaminetetraacetate.$2H_2O$ was added and stirred vigorously on a magnetic stirrer. The pH was adjusted to 8.0 with NaOH (20 g of NaOH pellets). The volume was adjusted to 1 litre. The solution was dispensed into aliquots and sterilized by autoclaving for 15 minutes at 15 lb/in^2.

7. 2xPBS

8 mM Na_2HPO_4

1.5 mM KH_2PO_4

137 mM NaCl

2.7 mM KCl

The 2xPBS was adjusted the pH to 7.0 with 1N NaOH or 1N HCL. The solution was sterilized by autoclaving for 15 minutes at 15 lb/in^2.

8. 3 M Sodium acetate pH 5.2

To 800 ml of distilled water, 408.1 g of sodium acetate was added and adjusted the pH to 5.2 with glacial acetic acid. The volume was adjusted to 1 litre. The solution was sterilized by autoclaving for 15 minutes at 15 lb/in^2.

9. 10% Sodium dodecyl sulphate (SDS)

The stock solution of 10% SDS was prepared by dissolved 10 g of sodium dodecyl sulphate in 100 ml sterilized distilled water. Streilization is not required for the preparation of this stock solution.

10. 1 M Tris-HCl pH 8.0

The 1M Tris was prepared by dissolving 121.1 g of Tris base in 800 ml of distilled water. The pH was adjusted to the desired value by adding conc. HCL (pH 8.0, 42 ml of HCl). The solution was cooled to room temperature before making final adjustment to the desired pH. The volume of the solution was adjusted to 1 litter with with distilled water and sterilized by autoclaving.

11. RNase A solution

RNase A	20	mg
0.15 M NaCl	10	ml

Dissolve 20 mg of RNase A in 10 ml 0.15 M NaCl and heat at 95° C for 5-10 minutes. Keep RNase A solution in -20°C.

12. Proteinase K

Proteinase K (Sigma)	4	mg
50 mM Tris-HCl (pH 7.5)	1	ml

Use freshly prepared solution.

13. Nuclease P_1 solution

Nuclease P1	0.1	mg
40 mM CH_3COONa+12 mM $ZnSO_4$ (pH5.3)	1	ml

Store at 4°C.

14. Alkaline phosphatase solution

Alkaline phosphatase	2.4	units
0.1 M Tris-HCl (pH 8.1)	1	ml

15. 0.1 M Tris-HCl buffer, pH 9

Tris	1.21	mg
Distilled water	100	ml

Adjust the pH to 9 with HCl.

16. TE buffer

10 mM Tris HCl (pH 8.0)

1 m M Na_2-EDTA (pH 8.0)

17. TE buffer + RNase A

TE buffer	960 ml
RNase A (2 mg/ml)	100 μl

18. Saline-Na_2 EDTA

0.1 M NaCl

50 mM EDTA.2Na (pH 8.0)

19. Fehling's solution

Coppersulfate	34.64 g
Sodiumpotassiumtartate	173 g
Sodiumhydroxide	50 g

Solvent was composed of a mixture 500 ml of coppersulfate and 500 ml of mixture sodiumtatare and sodiumhydroxide.

20. Flagella staining

Basic fuchisin	0.5 g
Tannic acid	0.2 g
Aluminium sulfate	0.5 g

Solvent was composed of a mixture of 2.0 of 95% ethanol, 0.5 ml of glycerol, and 7.5 ml of Tris (hydroxymethyl) aminomethane (Tris) buffer.

APPENDIX D

16S rDNA nucleotide sequences

1. The 16S rDNA nucleotide sequence of strain PA3-3

CGCACGAAGGTTTCGGCCTTAGTGGCGGACGGGTGAGTAACGCGTAGGTATCTATCCATGGGTGGGG
GATAACACTGGGAAACTGGCTATACCGCATGACACCTGAGGGTCAAAGGCGTAAGTCGCCTGTGGA
GGAGCCTGCGTTTGATTAGCTAGTTGGTGGGGTAAAGGCCTACCAGGCGATGATCAATAGCTGGTTT
GAGAGGATGATCAGCCACACTGGGACTGAGACACGGCCCAGACTCCTACGGGAGGCAGCAGTGGGG
AATATTGGACAATGGGGGCAACCCTGATCCAGCAATGACGCGTGTGTGAAGAAGGTCTTCGGATTGT
AAAGCACTTTCGACGGGGACGATGATGACGGTACCCGTAGAAGAAGCCCCGGCTAACTTCGTGCCA
GCAGCCGCGGTAATACGAAGGGGGCTAGCGTTGCTCGGAATGACTGGGCGTAAAGGGCGTGTAGGC
GGTTTGTACAGTCAGATGTGAAATCCCCGGGCTTAACCTGGGAGCTGCATTTGATACGTCAGACTAG
AGTGTGAGAGAGGGTTGTGGAATTCCCAGTGTAGAGGTGAAATTCGTAGATATTGGGAAGAACACC
GGTGGCGAAGGCGGCAACCTGGCTCATTATCTGAGGCGCGAAAGCGTGGGGAGCAAACAGGATTAG
ATACCCTGGTAGTCCACGCTGTAAACGATGTGGCTAGATGTTGGGTGACTTAGTCATTCAGTGTCGCA
GTTAACGCGTTAAGCACCCGCCTSGGGAGTACCACCGCAAGGTTGAAACTCAAAGGAATTGACGGGG
GCCCGCACAAGCGGTGGAGCATGTGGTTTAATTCGAAGCAACGCGCAGAACCTTACCAGGCTTGAA
TGTAGAGGCTGCAAGCAGAGATGTTTGTTTCCCGGGACCTCTAACACAGGTGCTGCATGGCTGTCGT
CAGCTCGTGTCGTGAGATGTTGGGTTAAGTCCCCCAACGAGCGCAACCCCTATCTTTAGTTGCCATCA
GGTTGGGCTGGGCACTCTAAAGAGACTGCCGGTGACAAGCCCGAGGAAGGTGGGGATGACGTCAAG
TCCCCTTGGCCCTTATGTTCTGGGCTTCCCACGTGCTACAATGGCGGTGACAGTGGGAAGCTAGGTGG
TGACCCCCTGCTGATCTCTAAAAGCCGTCTCAGTTCGGATTGCACTCTGCCAATCCAGTGCATTAAAA
GAATCCCTAGTAATCCCGGGCCACATTCCCCGGTGAATACCTTTTCGGGCCTTTTTCACACCCCCCGT
CACACCATGGGAGTTGGTTTGACCTTAAGCCGGTGAGTAAGGCAAG

2. The 16S rDNA nucleotide sequence of strains MHM10-1

TTTGAGTTTGATCCCTGGCTCAGAGCGAACGCTGGCGGCATGCTTAACACATGCAAGTCGCACGAAG
GTTTCGGCCTTAGTGGCGGACGGGTGAGTAACGCGTAGGAATCTATCCATGGGTGGGGGATAACTCT
GGGAAACTGGAGCTAATACCGCATGATACCTGAGGGTCAAAGGCGCAAGTCGCCTGTGGAGGAGCC
TGCGTTTGATTAGCTTGTTGGTGGGGTAATGGCCTACCAAGGCGATGATCAATAGCTGGTCTGAGAG
GATGATCAGCCACACTGGGACTGAGACACGGCCCAGACTCCTACGGGAGGCAGCAGTGGGGAATAT
TGGACAATGGGGGCAACCCTGATCCAGCAATGCCGCGTGTGTGAAGAAGGTTTTCGGATTGTAAAGC
ACTTTCGACGGGGACGATGATGACGGTACCCGTAGAAGAAGCCCCGGCTAACTTCGTGCCAGCAGCC
GCGGTAATACGAAGGGGGCTAGCGTTGCTCGGAATGACTGGGCGTAAAGGGCGTGTAGGCGGTTTG
TACAGTCAGATGTGAAATCCCCGGGCTTAACCTGGGAGCTGCATTTGATACGTGCAGACTAGAGTGT
GAGAGAGGGTTGTGGAATTCCCAGTGTAGAGGTGAAATTCGTAGATATTGGGAAGAACACCGGTGG
CGAAGGCGGCAACCTGGCTCATAACTGACGCTGAGGCGCGAAAGCGTGGGGAGCAAACAGGATTAG
ATACCCTGGTAGTCCACGCTGTAAACGATGTGTGCTAGATGTTGGGTAACTTAGTTATTCAGTGTCGC
AGTTAACGCGTTAAGCACACCGCCTGGGGAGTACGGCCGCAAGGTTGAAACTCAAAGGAATTGACG
GGGGCCCGCACAAGCGGTGGAGCATGTGGTTTATTCGAAGCACGCGCAGAACCTTACCAGGCTTGT
ATGGGTAGGCTGTGTCCAGAGATGGGCATTTCCCGCAAGGGACCTGCCGCACAGGTGCTGCATGGCT
GTCGTCAGCTCGTGTCGTGAGATGTTGGGTTAAGTCCCGCAACGAGCGCAACCCCTATCTTTAGTTGC
CAGCATGTTTGGGTGGGCACTCTAGAGAGACTGCCGGTGACAAGCCGGAGGAAGGTGGGGATGACG
TCAAGTCCTCATGGCCCTTATGTCCTGGGCTACACACGTGCTACAATGGCGGTGACAGTGGGAAGC
TAGATGGCGACATCGTGCTGATCTCTAAAAACCGTCTCAGTTCGGATTGTACTCTGCAACTCGAGTAC
ATGAAGGTGGAATCGCTAGTAATCGCGGATCAGCATGCCGCGGTGAATACGTTCCCGGGCCTTGTAC
ACACCGCCCGTCACACCATGGGAGTTGGTTTGACCTTAAGCCGGTGAGCGAACCCGCAAGGGG

3. The 16S rDNA nucleotide sequence of strain KLM13-1

TTTGAGTTTGATCCCTGGCTCAGAGCGAACGCTGGCGGCATGCTTAACACATGCAAGTCGCACGAAG
GTTTCGGCCTTAGTGGCGGACGGGTGAGTAACGCGTAGGAATCTATCCATGGGTGGGGGATAACTCT
GGGAAACTGGAGCTAATACCGCATGATACCTGAGGGTCAAAGGCGCAAGTCGCCTGTGGAGGAGCC
TGCGTTTGATTAGCTTGTTGGTGGGGTAATGGCCTACCAAGGCGATGATCAATAGCTGGTCTGAGAG
GATGATCAGCCACACTGGGACTGAGACACGGCCCAGACTCCTACGGGAGGCAGCAGTGGGGAATAT
TGGACAATGGGGGCAACCCTGATCCAGCAATGCCGCGTGTGTGAAGAAGGTTTTCGGATTGTAAAGC
ACTTTCGACGGGGACGATGATGACGGTACCCGTAGAAGAAGCCCCGGCTGACGATGATGACGGTAC
CCGTAGAAGAAGCCCCGGCTAACTTCGTGCCAGCAGCCGCGGTAATACGAAGGGGGCTAGCGTTGCT
CGGAATGACTGGGCGTAAAGGGCGTGTAGGCGGTTTGTACAGTCAGATGTGAAATCCCCGGGCTTAA
CCTGGGAGCTGCATTTGATACGTCAGACTAGAGTGTGAGAGAGGGTTGTGGAATTCCCAGTGTAGAG
GTGAAATTCGTAGATATTGGGAAGAACACCGGTGGCGAAGGCGGCAACCTGGCTCATTATCTGAGGC
GCGAAAGCGTGGGGAGCAAACAGGATTAGATACCCTGGTAGTCCACGCTGTAAACGATGTGGCTAG
ATGTTGGGTGACTTAGTCATTCAGTGTCGCAGTTAACGCGTTAAGCACCCGCCTSGGGAGTACCACCG
CAAGGTTGAAACTCAAAGGAATTGACGGGGGCCCGCACAAGCGGTGGAGCATGTGGTTTAATTCGA
AGCAACGCGCAGAACCTTACCAGGGCTTGAATGTAGAGGCTGCAAGCAGAGATGTTTGTTTCCCGGG
ACCTCAGTCCCGCAACGAGCGCAACCCCTATCTTTAGTTGCCAGCATGTTTGGGTGGGCACTCTAGA
GAGACTGCCGGTGACAAGCCGGAGGAAGGTGGGGATGACGTCAAGTCCTCATGGCCCTTATGTCCTG
GGCTACACACGTGCTACAATGGCGGTGACAGTGGGAAGCTAGATGGCGACATCGTGCTGATCTCTAA
AAACCGTCTCAGTTCGGATTGTACTCTGCAACTCGAGTACATGAAGGTGGAATCGCTAGTAATCGCG
GATCAGCATGCCGCGGTGAATACGTTCCCGGGCCTTGTACACACCGCCCGTCACACCATGGGAGTTG
GTTTGACCTTAAGCCGGTGAGCGAACCCGCAAGGGG

4. The 16S rDNA nucleotide sequence of strain BBM91-1

TGAGTTTGATCCCTGGCTCAGAGCGAACGCTGGCGGCATGCTTAACACATGCAAGTCGCACGAAGGT
TTCGGCCTTAGTGGCGGACGGGTGAGTAACGCGTAGGAATCTATCCATGGGTGGGGGATAACTCTGG
GAAACTGGAGCTAATACCGCATGATACCTGAGGGTCAAAGGCGCAAGTCGCCTGTGGAGGAGCCTG
CGTTTGATTAGCTTGTTGGTGGGGTAATGGCCTACCAAGGCGATGATCAATAGCTGGTCTGAGAGGA
TGATCAGCCACACTGGGACTGAGACACGGCCCAGACTCCTACGGGAGGCAGCAGTGGGGAATATTG
GACAATGGGGGCAACCCTGATCCAGCAATGCCGCGTGTGTGAAGAAGGTTTTCGGATTGTAAAGCAC
TTTCGACGGGGACGATGATGACGGTACCCGTAGAAGAAGCCCCGGCTGACGATGATGACGGTACCC
GTAGAAGAAGCCCCGGCTAACTTCGTGCCAGCAGCCGCGGTAATACGAAGGGGGCTAGCGTTGCTC
GGAATGACTGGGCGTAAAGGGCGTGTAGGCGGTTTGTACAGTCAGATGTGAAATCCCCGGGCTTAAC
CTGGGAGCTGCATTTGATACGTCAGACTAGAGTGTGAGAGAGGGTTGTGGAATTCCCAGTGTAGAGG
TGAAATTCGTAGATATTGGGAAGAACACCGGTGGCGAAGGCGGCAACCTGGCTCATTATCTGAGGCG
CGAAAGCGTGGGGAGCAAACAGGATTAGATACCCTGGTAGTCCACGCTGTAAACGATGTGGCTAGA
TGTTGGGTGACTTAGTCATTCAGTGTCGCAGTTAACGCGTTAAGCACCCGCCTSGGGAGTACCACCGC
AAGGTTGAAACTCAAAGGAATTGACGGGGGCCCGCACAAGCGGTGGAGCATGTGGTTTAATTCGAA
GCAACGCGCAGAACCTTACCAGGGCTTGAATGTAGAGGGTGACTTAGTCATTCAGTGTCGCAGTTAA
CGCGTTAAGCACCCGCCTSGGGAGTACCACCGCAAGGTTGAAACTCAAAGGAATTGACGGGGGCCC
GCACAAGCGGTGGAGCATGTGGTTTAATTCGAAGCAACGCGCAGAACCTTACCAGGGCTTGAATGTA
GAGGCTGCAAGCAGAGATGTTTGTTTCCCGGGACCTCAGTCCCGCAACGAGCGCAACCCCTATCTTT
TACACACCGCCCGTCACACCATGGGAGTTGGTTTGACCTTAAGCCGGTGAGCGAACCCGCAAGGGGG
CTTGAATGTAGAGGCTGCAAGCAGAGATGTTTGTTTCCCGGGACCTCAGTCCCGCAACGAGCGCAAC
CCCTATCTTTAGTTGCCAGCATGTTTGGGTGGGCACTCTAGAG

5. The 16S rDNA nucleotide sequence of strain FBM4-3

TGATCCCTGGCTCAGAGCGAACGCTGGCGGCATGCTTAACACATGCAAGTCGCACGAAGGTTTCGGC
CTTAGTGGCGGACGGGTGAGTAACGCGTAGGAATCTATCCATGGGTGGGGGATAACTCTGGGAAACT
GGAGCTAATACCGCATGATACCTGAGGGTCAAAGGCGCAAGTCGCCTGTGGAGGAGCCTGCGTTTGA
TTAGCTTGTTGGTGGGGTAATGGCCTACCAAGGCGATGATCAATAGCTGGTCTGAGAGGATGATCAG
CCACACTGGGACTGAGACACGGCCCAGACTCCTACGGGAGGCAGCAGTGGGGAATATTGGACAATG
GGGGCAACCCTGATCCAGCAATGCCGCGTGTGTGAAGAAGGTTTTCGGATTGTAAAGCACTTTCGAC
GGGGACGATGATGACGGTACCCGTAGAAGAAGCCCCGGCTGACGATGATGACGGTACCCGTAGAAG
AAGCCCCGGCTAACTTCGTGCCAGCAGCCGCGGTAATACGAAGGGGGCTAGCGTTGCTCGGAATGAC
TGGGCGTAAAGGGCGTGTAGGCGGTTTGTACAGTCAGATGTGAAATCCCCGGGCTTAACCTGGGAGC
TGCATTTGATACGTCAGACTAGAGTGTGAGAGAGGGTTGTGGAATTCCCAGTGTAGAGGTGAAATTC
GTAGATATTGGGAAGAACACCGGTGGGTACCCGTAGAAGAAGCCCCGGCTAACTTCGTGCCAGCAG
CCGCGGTAATACGAAGGGGGCTAGCGTTGCTCGGAATGACTGGGCGTAAAGGGCGTGTAGGCGGTT
TGTACAGTCAGATGTGAAATCCCCGGGCTTAACCTGGGAGCTGCATTTGATACGTGCAGACTAGAGT
GTGAGAGAGGGTTGTGGAATTCCCAGTGTAGAGGTGAAATTCGTAGATATTGGGAAGAACACCGGT
GGCGAAGGCGGCAACCTGGCTCATAACTGACGCTGAGGCGCGAAAGCGTGGGGAGCAAACAGGATT
AGATACCCTGGTAGTCCACGCTGTAAACGATGTGTGCTAGATGTTGGGTAACTTAGTTATTCAGTGTC
GCAGTTAACGCGTTAAGCACACCGCCTGGGGAGTACGGCCGCAAGGTTGAAACTCAAAGGAATTGA
CGGGGGCCCGCACAAGCGGTGGAGCATGTGGTTTATTCGAAGCACGCGCAGAACCTTACCAGGGCTT
GTATGGGTTAGAGAGACTGCCGGTGACAAGCCGGAGGAAGGTGGGGATGACGTCAAGTCCTCATGG
CCCTTATTTCCCGGGACCTCAGTCCCGCAACGAGCGCAACCCCTATCTTTAGTTGCCAGCATGTTTGG
GTGGGCACTCTAGAG

6. The 16S rDNA nucleotide sequence of strain LBM3-1

AGCGAACGCTGGCGGCATGCTTAACACATGCAAGTCGCACGAACCTTTCGGGGTTAGTGGCGGACGG
GTGAGTAACGCGTAGGAATCTGTCCACGGGTGGGGGATAACTCTGGGAAACTGGAGCTAATACCGA
TGATACCTGAGGGTCAAAGGCTGGAGCATGTGGTTAATTCGGCAAGTCGCCTGTGGAGGAGCCTGCG
TTCGATTAGCTAGTTGGTGGGTAAAGGCCTACCAAGGCGATGATCGATAGCTGGTTTGAGAGGATGA
TCAGCCACACTGGGACTGGACACGGCCCAGACTCCTACGGGGCAACCCTGATCAGCAATGCCGCGTG
TGTGAAGAAGGTCTTCGGATTGTAAAGCACTTTCGACGGGGACGATGATGACGTACCCGTAGAAGAA
GCCCCGGCTAACTTCGTGCCAGCAGCCGCGGTAATACGAAGGGGGCTAGCGTGCTCGGAATGACTGG
GCGTAAAGGGCGTGTAGGCGGTTTACACAGTCAGATGTGAAATCCCCGGGCTAACCTGGGAGCTGCA
TTTGATACGTGTAGACTAGAGTGTGAGAGAGGGTTGTGGAATTCCCAGTGTAAGGTGAAATTCGTAG
ATATTGGGAAGAACACCGGTGGCGAAGGCGGCAACCTGGCTCATGACTGACCTGAGGCGCGAAAGC
GTGGGGAGCAAACAGGATTAGATACCCTGGTAGTCCACGCTGTAAACGATGGTGCTAGATGTTGGGT
AACTTTGTTATTCAGTGTCGCAGTTAACGCGTTAAGCACACCGCCTGGGGAGACGGCCGCAAGGTTG
AAACTCAAAGGAATTGACGGGGGCCCGCACAAGCGGTGGAGCATGTGGTTAATTCGAAGCAACGCG
CAGAACCTTACCAGGGCTTGAATGTAGAGGCTGTATTCAGAGATGGATATTCCCGCAAGGGACCTCT
AACACAGGTGCTGCATGGCTGTCGTCAGCTCGTGTCGTGAGATGTTGGGTTAGTCCCGCAACGAGCG
CAACCCCTATCTTTAGTTGCCAGCATGTTTGGGTGGGCACTCTAGAGAGACGCCGGTGACAAGCCGG
AGGAAGGTGGGGATGACGTCAAGTCCTCATGGCCCTTATGTCCTGGGCTACACGTGCTACAATGGCG
GTGACAGTGGGAAGCTAGATGGTGACATCATGCTGATCTCTAAAAGCCGTCAGTTCGGATTGCACTC
TGCAACTCGAGTGCATGAAGGTGGAATCGCTAGTAATCGCGGATCAGCATGGCGGTGAATACGTTCC
CGGGCCTTGTACACACCGCCCGTCACACCATGGGAGTTGGTTTGACCTTAACCGGTGAGCGAACCCG
CAAGGGGCGCAGCCGACCACGGTCGGGTCAGCGACTGGGGTGAAGTCGTAAAAGGTAGCCGTAGGG
GAACC

7. The 16S rDNA nucleotide sequence of strain JR70-1

GAGTTTGATTCTGGCTCAGATTCGAGGGGACGATGATGACGGTGCACGAAGGTTGCCTTAGTGGCGG
ACGGGTGAGTAACGCGTAGGGATCTATCCACGGGTGGGGGACAACTTCGGGAACTGGAGCTAATAC
CGCATGATACCTGAGGGTCAAAGGCGCAAGTCGCCTGTGGAGGAACCTGCGTCGATTAGCTAGTTGG
TGGGGTAAAGGCCTACCAAGGCGATGATCGATAGCTGGTTTGAGAGGATGATAGCCACACTGGGAC
TGAGACACGGCCCAGACTCCTACGGGAGGCAGCAGTGGGGAATATTGGACAAGGGCGAAAGCCTGA
TCCAGCAATGCCGCGTGTGTGAAGAAGGTCTTCGGATTGTAAAGCACTTTCGAGGGGACGATGATGA
CGGTACCCGTAGAAGAAGCCCCGGCTAACTTCGTGCCAGCAGCCGCGGTAATCGAAGGGGGCTAGC
GTTGCTCGGAATGACTGGGCGTAAAGGGCGCGTAGGCGGTTGTTACAGTCAGTGTGAAATCCCCGGG
CTTAACCTGGGAACTGCATTTGATACGTGACGACTAGAGTTCGAGAGAGGGTGTGGAATTCCCAGTG
TAGAGGTGAAATTCGTAGATATTGGGAAGAACACCGGTGGCGAAGGCGGCACCTGGCTCGATACTG
ACGCTGAGGCGCGAAAGCGTGGGGAGCAAACAGGATTAGATACCCTGGTAGCCACGCTGTAAACGA
TGTGTGCTGGATGTTGGGAAACTTAGTTTCTCAGTGTCGAAGCTAACGCGCTAGCACACCGCCTGGG
GAGTACGGCCGCAAGGTTGAAACTCAAAGGAATTGACGGGGGCCCGCACAACGGTGGAGCATGTGG
TTTAATTCGAAGCAACGCGCAGAACCTTACCAGGGCTTGCATGGGGAGGACGGTTCAGAGATGGACC
TTTCTTCGGACCTCCCGCACAGGTGCTGCATGGCTGTCGTCAGCTCGTGTCGGAGATGTTGGGTTAAG
TCCCGCAACGAGCGCAACCCTTGTCTTTAGTTGCCAGCACTTTCAGGTGGGACTCTAGAGAGACTGC
CGGTGACAAGCCGGAGGAAGGTGGGGATGACGTCAAGTCCTCATGGCCCTATGTCCTGGGCTACACA
CGTGCTACAATGGCGGTGACAGTGGGAAGCTACATGGTGACATGGTGCTGCTCTAAAAGCCGTCTCA
GTTCGGATTGTACTCTGCAACTCGAGTACATGAAGGTGGAATCGCTAGTATCGCGGATCAGCATGCC
GCGGTGAATACGTTCCCGGGCCTTGTACACACCGCCCGTCACACCATGGGGTTGGTTCGACCTTAAG
CCGGTGAGCGAACCGCAAGGACGCAGCCGACCACGGACGGGTCAGCGACGGGGTGAAGTCGTAACA
AGGTAGCCGTAGGGGAACCTGCGGCTGGATCACCTCCTTT

8. The 16S rDNA nucleotide sequence of strain AK32-2

TGGCTCAGAGCGAACGCTGGCGGCATGCTTAACACATGCAAGTCGCACGGATCTTTCGGGATCAGTG
CGGACGGGTCTATACGCGAAAGCGTGGGGAGCAACCGCATGATACCTGAGGGTCAAAGGCGCAAGT
CGCCTGTGGAGGAACCTGCGTTCGATTAGCTATGGTGGGGTAAAGGCCTACCAAGGCGATGATCGAT
AGCTGGTTTGAGAGGATGATCAGCCACACTGGACTGAGACACGGCCCAGACTCCTACGGGAGGCAG
CAGTGGGGAATATTGGACAATGGGCGAAAGCGATCCAGCAATGCCGCGTGTGTGAAGAAGGTCTTC
GGATTGTAAAGCACTTTCGACGGGGACGATGAGACGGTACCCGTAGAAGAAGCCCCGGCTAACTTC
GTGCCAGCAGCCGCGGTAATACGAAGGGGGCTGCGTTGCTCGGAATGACTGGGCGTAAAGGGCGCG
TAGGCGGTTTATGCAGTCAGATGTGAAATCCCCGGCTTAACCTGGGAACTGCATTTGAGACGCATAG
ACTAGAGGTCGAGAGAGGGTTGTGGAATTCCCATGTAGAGGTGAAATTCGTAGATATTGGGAAGAA
CACCGGTGGCGAAGGCGGCAACCTGGCTCGATATGACGCTGAGGCGCGAAAGCGTGGGGAGCAAAC
AGGATTAGATACCCTGGTAGTCCACGCTGTAAAGATGTGTGCTGGATGTTGGGTAACTTAGTTACTC
AGTGTCGAAGCTAACGCGCTAAGCACACCGCCTGGGAGTACGGCCGCAAGGTTGAAACTCAAAGGA
ATTGACGGGGGCCCGCACAAGCGGTGGAGCATGGTTTAATTCGAAGCAACGCGCAGAACCTTACCA
GGACTTGCATGGGGAGGACGTACTCAGAGATGGATTTCTTCGGACCTCCCGCACAGGTGCTGCATGG
CTGTCGTCAGCTCGTGTCGTGAGATGTTGGGTTAATCCCGCAACGAGCGCAACCCTTGTCTTTAGTTG
CCAGCACTTTCAGGTGGGCACTCTAGAGAGACTGGGTGACAAGCCGGAGGAAGGTGGGGATGACGT
CAAGTCCTCATGGCCCTTATGTCCTGGGCTACACAGTGCTACAATGGCGGTGACAGTGGGAAGCTAC
ATGGCGACATGGTGCTGATCTCTAAAAGCCGTCTCTTCGGATTGTACTCTGCAACTCGAGTACATGAA
GGTGGAATCGCTAGTAATCGCGGATCAGCATGCCCGGTGAATACGTTCCCGGGCCTTGTACACACCG
CCCGTCACACCATGGGAGTTGGTTCGACCTTAAGCGGTGAGCGAACCGCAAGGACGCAGCCGACC

9. The 16S rDNA nucleotide sequence of strain LD51-1

GAGTTTGATTCTGGCTAACACATGCAAGTCGCACGGATCTTTCGGGATTAGTGGCGGACGGGTGAGT
AACGCGTAGGGATCTATCCATGGGTGGGGGACAACTCCGGGAAACTGGAGCTAATACCGCATGATA
CCTGAGGGTCAAAGGCGCAAGTCGCCTGTGGAGGAACCTGCGTTCGATTAGCTAGTTGGTGGGGTAA
AGGCCTACCAAGGCGATGATCGATAGCTGGTTTGAGAGGATGATCAGCCACACTGGGACTGAGACA
CGGCCCAGACTCCTACGGGAGGCAGCAGTGGGGAATATTGGACAATGGGCGAAAGCCTGATCCAGC
AATGCCGCGTGTGTGAAGAAGGTCTTCGGATTGTAAAGCACTTTCGACGGGGACGATGATGACGGTA
CCCGTAGAAGAAGCCCCGGCTAACTTCGTGCCAGCAGCCGCGGTAATACGAAGGGGGCTAGCGTTG
CTCGGAATGACTGGGCGTAAAGGGCGCGTAGGCGGTTGATGCAGTCAGATGTGAAATCCCCGGGCTT
AACCTGGGAACTGCATTTGAGACGCATTGACTAGAGTTCGAGAGAGGGTTGTGGAATTCCCAGTGTA
GAGGTGAAATTCGTAGATATTGGGAAGAACACCGGTGGCGAAGGCGGCAACCTGGCTCGATACTGA
CGCTGAGGCGCGAAAGCGTGGGGAGCAAACAGGATTAGATACCCTGGTAGTCCACGCTGTAAACGA
TGTGTGCTGGATGTTGGGTAACTTAGTTACTCAGTGTCGAAGCTAACGCGCTAAGCACACCGCCTGG
GGAGTACGGCCGCAAGGTTGAAACTCAAAGGAATTGACGGGGGCCCGCACAAGCGGTGGAGCATGT
GGTTTAATTCGAAGCAACGCGCAGAACCTTACCAGGGCTTGCATGGGGAGGACGTACTCAGAGATG
GGTATTTCTTCCGACCTCCCGCACAGGTGCTGCATGGCTGTCGTCAGCTCGTGTCGTGAGATGTTGGG
TTAAGTCCCGCAACGAGCACAACCCTTGTCTTTAGTTGCCAGCACTTTCAGGTGGCACTCTAGAGA
GACTGCCGGTGACAAGCCGGAGGAAGGTGGGGATGACGTCAAGTCCTCATGGCCCTTATGTCCTGGG
CTACACACGTGCTACAATGGCGGTGACAGTGGGAAGCTATGTGGTGACACAGTGCTGATCTCTAAAA
GCCGTCTCAGTTCGGATTGTACTCTGCAACTCGAGTACATGAAGGTGGAATCGCTAGTAATCGCGGA
TCAGCATGCCGCGGTGAATACGTTCCCGGGCCTTGTACACACCGCCCGTCACACCATGGGAGTTGGT
TCGACCTTAAGCCGGTGAGCGAACCGCAAGGACGCAGCCGACCACGGACGGGTCAGCGACTGGGGT
GAAGTCGTAACAAGGTAGCCGTAGGGGAACCTGCGGCTGGATCACCTCCTTT

9. The 16S rDNA nucleotide sequence of strain MG71-2

TTGAGTTTGATCCTGGCTCGCATGCTTAACACATGCAAGTCGCACGGATCTTTCGGGATTAGTGGCGG
ACGGGTGAGTAACGCGTAGGGATCTATCCACGGGTGGGGGACAACTCCGGGAAACTGGAGCTAATA
CCGCATGATACCTGAGGGTCAAAGGCGCAAGTCGCCTGTGGAGGAACCTGCGTTCGATTAGCTAGTT
GGTGGGGTAAAGGCCTACCAAGGCGATGATCGATAGCTGGTTTGAGAGGATGATCAGCCACACTGG
GACTGAGACACGGCCCAGACTCCTACGGGAGGCAGCAGTGGGGAATATTGGACAATGGGCGAAAGC
CTGATCCAGCAATGCCGCGTGTGTGAAGAAGGTCTTCGGATTGTAAAGCACTTTCGACGGGGACGAT
GATGACGGTACCCGTAGAAGAAGCCCCGGCTAACTTCGTGCCAGCAGCCGCGGTAATACGAAGGGG
GCTAGCGTTGCTCGGAATGACTGGGCGTAAAGGGCGCGTAGGCGGTTGATGCAGTCAGATGTGAAAT
CCCCGGGCTTAACCTGGGAACTGCATTTGAGACGCATTGACTAGAGGTCGAGAGAGGGTTGTGGAAT
TCCCAGTGTAGAGGTGAAATTCGTAGATATTGGGAAGAACACCGGTGGCGAAGACGGCAACCTGGC
TCGATACTGACGCTGAGGCGCGAAAGCGTGGGGAGCAAACAGGATTAGATACCCTGGTAGTCCACG
CTGTAAACGATGTGTGCTGGATGTTGGGTAACTTAGTTACTCAGTGTCGAAGCTAACGCGCTAAGCA
CACCGCCTGGGGAGTACGGCCGCAAGGTTGAAACTCAAAGGAATTGACGGGGGCCCGCACAAGCGG
TGGAGCATGTGGTTTAATTCGAAGCAACGCGCAGAACCTTACCAGGGCTTGCATGGGGAGGACGTAC
TCAGAGATGGGTATTTCTTCGGACCTCCCGCACAGGTGCTGCATGGCTGTCGTCAGCTCGTGTCGTGA
GATGTTGGGTTAAGTCCCGCAACGAGCGCAACCCTTGTCTTTAGTTGCCAGCACTTTCAGGTGGGCAC
TCTAGAGAGACTGCCGGTGACAAGCCGGAGGAAGGTGGGGATGACGTCAAGTCCTCATGGCCCTTAT
GTCCTGGGCTACACACGTGCTACAATGGCGGTGACAGTGGGAAGCTATGTGGTGACACAGTGCTGAT
CTCTAAAAGCCGTCTCAGTTCGGATTGTACTCTGCAACTCGAGTACATGAAGGTGGAATCGCTAGTA
ATCGCGGATCAGCATGCCGCGGTGAATACGTTCCCGGGCCTTGTACACACCGCCCGTCACACCATGG
GAGTTGGTTCGACCTTAAGCCGGTGAGCGAACCGCAAGGACGCAGCCGACCACGGACGGGTCAGCG
AGCTGGGGTGAAGTCGTAACANG

10. The 16S rDNA nucleotide sequence of strain AN1-1

AGCGAACGCTGGCGGCATGCTTAACACATGCAAGTCGCACGGATCTTTCGGGATTAGTGGCGGACGG
GTGAGTAACGCGTAGGGATCTATCCATGGGTGGGGGACAACTCCGGGAAACTGGAGCTAATACCGC
ATGATACCTGAGGGTCAAAGGCGTAAGTCGCCTGTGGAGGAACCTGCGTTCGATTAGCTAGTTGGTG
GGGTAAAGGCCTACCAAGGCGATGATCGATAGCTGGTTTGAGAGGATGATCAGCCACACTGGGACT
GAGACACGGCCCAGACTCCTACGGGAGGCAGCAGTGGGGAATATTGGACAATGGGCGAAAGCCTGA
TCCAGCAATGCCGCGTGTGTGAAGAAGGTCTTCGGATTGTAAAGCACTTTCGACGGGGACGATGATG
ACGGTACCCGTAGAAGAAGCCCCGGCTAACTTCGTGCCAGCAGCCGCGGTAATACGAAGGGGGCTA
GCGTTGCTCGGAATGACTGGGCGTAAAGGGCGCGTAGGCGGTTGATGCAGTCAGATGTGAAATCCCC
GGGCTTAACCTGGGAACTGCATTTGAGACGCATTGACTAGAGTTCGAGAGAGGGTTGTGGAATTCCC
AGTGTAGAGGTGAAATTCGTAGATATTGGGAAGAACACCGGTGGCGAAGGCGGCAACCTGGCTCGA
TACTGACGCTGAGGCGCGAAAGCGTGGGGAGCAAACAGGATTAGATACCCTGGTAGTCCACGCTGT
AAACGATGTGTGCTGGATGTTGGGTAACTTAGTTACTCAGTGTCGAAGCTAACGCGCTAAGCACACC
GCCTGGGGAGTACGGCCGCAAGGTTGAAACTCAAAGGAATTGACGGGGGCCCGCACAAGCGGTGGA
GCATGTGGTTTAATTCGAAGCAACGCGCAGAACCTTACCAGGGCTTGCATGGGGAGGACGTACTCAG
AGATGGGTATTTCTTCGGACCTCCCGCACAGGTGCTGCATGGCTGTCGTCAGCTCGTGTCGTGAGATG
TTGGGTTAAGTCCCGCAACGAGCGCAACCCTTGTCTTTAGTTGCCAGCACTTTCAGGTGGGCACTCTA
GAGAGACTGCCGGTGACAAGCCGGAGGAAGGTGGGGATGACGTCAAGTCCTCATGGCCCTTATGTC
CTGGGCTACACACGTGCTACAATGGCGGTGACAGTGGGAAGCTATGTGGTGACACAGTGCTGATCTC
TAAAAGCCGTCTCAGTTCGGATTGTACTCTGCAACTCGAGTACATGAAGGTGGAATCGCTAGTAATC
GCGGATCAGCATGCCGCGGTGAATACGTTCCCGGGCCTTGTACACACCGCCCGTCACACCATGGGAG
TTGGTTCGACCTTAAGCCGGTGAGCGAACCGCAAGGACGCAGCCGACC

11. The 16S rDNA nucleotide sequence of strain MG71-1

AGCGAACGCTACGGACCCTTCGGGGTGAGTGGCGGACGGGTGAGTATCGCGTAGGGATCTATCCATG
GGTGGGGGATAACATCGGGAAACTGGTGCTAATACCGCATGATACCTGAGGGTCAAAGGCGCAAGT
CGCCTGTGGAGGAGCCTGCGTTCGATTAGCTTGTTGGTGGGGTAAAGGCCTACCAAGGCGATGATCG
ATAGCTGGTCTGAGAGGATGATCAGCCACACTGGGACTGAGACACGGCCCAGACTCCTACGGGAGG
CAGCAGTGGGGAATATTGGACAATGGGCGAAAGCCTGATCCAGCAATGCCGCGTGTGTGAAGAAGG
TCTTCGGATTGTAAAGCACTTTCGACGGGGACGATGATGACGGTACCCGTAGAAGAAGCCCCGGCTA
ACTTCGTGCCAGCAGCCGCGGTAATACGAAGGGGGCTAGCGTTGCTCGGAATGACTGGGCGTAAAG
GGCGCGTAGGCGGTTTACACAGTCAGATGTGAAATTCCAGGGCTTAACCTTGGGGCTGCATTTGATA
CGTGTAGACTAGAGTGTGAGAGAGGGTTGTGGAATTCCCAGTGTAGAGGTGAAATTCGTAGATATTG
GGAAGAACACCGGTGGCGAAGGCGGCAACCTGGCTCATTACTGACGCTGAGGCGCGAAAGCGTGGG
GAGCAAACAGGATTAGATACCCTGGTAGTCCACGCTGTAAACGATGTGTGCTGGATGTTGGGTAACT
TAGTTACTCAGTGTCGAAGCTAACGCGCTAAGCACACCGCCTGGGGAGTACGGCCGCAAGGTTGAAA
CTCAAAGGAATTGACGGGGGCCCGCACAAGCGGTGGAGCATGTGGTTTAATTCGAAGCAACGCGCA
GAACCTTACCAGGGCTTGACATGGGGAGGCTGTATCCAGAGATGGGTATTTCCCGCAAGGGACCTCC
TGCACAGGTGCTGCATGGCTGTCGTCAGCTCGTGTCGTGAGATGTTGGGTTAAGTCCCGCAACGAGC
GCAACCCTCGCCTTTAGTTGCCAGCACGTTTGGGTGGGCACTCTAGAGGAACTGCCGGTGACAAGCC
GGAGGAAGGTGGGGATGACGTCAAGTCCTCATGGCCCTTATGTCCTGGGCTACACACGTGCTACAAT
GGCGGTGACAGTGGGAAGCTAGATGGTGACATCGTGCCGATCTCTAAAAGCCGTCTCAGTTCGGATT
GTACTCTGCAACTCGAGTGCATGAAGGTGGAATCGCTAGTAATCGCGGATCAGCATGCCGCGGTGAA
TACGTTCCCGGGCCTTGTACACACCGCCCGTCACACCATGGGAGTTGGTTTGACCCGAAGCCGGTGA
GCGAACCGCAAGGACGCAGCCGACCACGGTCGGGTCAGCGACTGGGGTG

12. The 16S rDNA nucleotide sequence of strain SIS32-2

CGCACGGACGAGTAACGCGTAGGTATCTATCCATGGTGGGGGACAACTCTGGGAAACTGGAGCTA
ATACCGCATGACACCTGAGGGTCAAAGGCGCAAGTCGCCTGGGAGGAGCCTGCGTTCGATTAGCTTG
TTGGTGGGGTAATGGCCTACCAAGGCGATGATCGATAGCTGGTCTGAGAGGATGATCAGCCACACTG
GGACTGAGACACGGCCCAGACTCCTACGGGAGGCAGCAGTGGGGAATATTGGACAATGGGCGCAAG
CTGATCCAGCAATGCCGCGTGTGTGAAGAAGGTTTTCGGATTGTAAAGCACTTTCGACGGGGACGAT
GATGACGGTATCGTAGATATTGGGAAGAACACCGGTGGCGAAGGCGGCAACCTGGCTCATAACTGA
CGCTGAGGCGCGAAAGCGTGGGGAGCAAACAGGATTAGATACCCTGGTAGTCCACGCTGTAAACGA
TGTGTGCTGGATGTTGGGTGACTTAGTCATTCAGTGTCGTAGTTAACGCGATAAGCACACCGCCTGG
GGAGTACGGCCGCAAGGTTGAAACTCAAAGGAATTGACGGGGGCCCGCACAAGCGGTGGAGCATGT
GGTTTAATTCGAAGCAACGCGCAGAACCTTACCAGGGCTTGACATGGGGAGGCTGTATCCAGAGATG
GGTATTTCCCGCAAGGGACCTCCTGCACAGGTGCTGCATGGCTGTCGTCAGCTCGTGTCGTGAGATGT
TGGGTTAAGTCATGATGACGGTATCGTAGATATTGGGAAGAACACCGGTGGCGAAGGCGGCAACCT
GGCTCATAACTGACGCTGAGGCGCGAAAGCGTGGGGAGCAAACAGGATTAGATACCCTGGTAGTCC
ACGCTGTAAACGATGTGTGCTCCGCAACGAGCGCAACCCTCGCCTTTAGTTGCCAGCATGATTGGGT
GGGCACTCTAAAGGAACTGCCGGTGACAAGCCGGAGGAAGGTGGGGATGACGTCAAGTCCTCATGG
CCCTTATGTCCTGGGCTACACACGTGCTACAATGGCGGTGACAGTGGGAAGCCAGGCAGCGATGCCG
AGCTGATCTCAAAAAGCCGTCTCAGTTCGGATTGCACTCTGCAACTCGAGTGCATGAAGGTGGAATC
GCTAGTAATCGCGGATCAGCATGCCGCGGTGAATACGTTCCCGGGCCTTGTACACGGCGATGATCGA
TAGCTGGTCTGAGAGGATGATCAGCCACACTGGGACTGAGACACGGCCCAGACTCCTACGGGAGGC
AGCAGTGGGGAATATTGGACAATGGGCGCAAGCTGATCCAGCAATGCCGCGTGTGTGAAGAAGGTC
TTCGGATTGTAAAGCACTTTCGACGGGGACGATGATGACGGTA

13. The 16S rDNA nucleotide sequence of strain SI15-1

AGCGAACGCTGGCGGCATGCTTAACACATGCAAGTCGCACGGACCTTTCGGGGTGAGTGGCGGACG
GGTGAGTAACGCGTAGGGATCTATCCACGGGTGGGGGATAACACCGGGAAACTGGTGCTAATACCG
CATGATACCTGAGGGTCAAAGGCGTAAGTCGCCTGTGGAGGAGCCTGCGTTCGATTAGCTTGTTGGT
GGGGTAAAGGCCTACCAAGGCGATGATCGATAGCTGGTCTGAGAGGATGATCAGCCACACTGGGAC
TGAGACACGGCCCAGACTCCTACGGGAGGCAGCAGTGGGGAATATTGGACAATGGGCGCAAGCCTG
ATCCAGCAATGCCGCGTGTGTGAAGAAGGTTTTCGGATTGTAAAGCACTTTTAACGGGGACGATGAT
GACGGTACCCAGAAGAAGCCCCGGCTACTTCGTGCCAGCAGCCGCGGTAATACGAAGGGGGCTAGC
GTTGCTCGGAATGACTGGGCGTAAGGGCGTGTAGGCGGTTTGCACAGTCAGATGTGAAATTCCAGGG
CTTAACCTTGGGGCTGCATTTGATACGTGTAGACTAGAGTGTGAGAGAGGGTTGTGGAATTCCCAGT
GTAGAGGTGAAATTCGTAGATATTGGGAAGAACACCGGTGGCGAAGGCGGCAACCTGGCTCATGAC
TGACGCTGAGGCGCGAAAGCGTGGGGAGCAAACAGGATTAGATACCCTGGTAGTCCACGCTGTAAA
CGATGTGTGCTGGATGTTGGGTAACTTGGTTACTCAGTGTCGAAGCTAACGCGCTAAGCACACCGCC
TGGGGAGTACGGCCGCAAGGTTGAAACTCAAAGGAATTGACGGGGGCCCGCACAAGCGGTGGAGCA
TGTGGTTTAATTCGAAGCAACGCGCAGAACCTTACCAGGGCTTGACATGGGGAGGCTGTATCCAGAG
ATGGGTATTTCCCGCAAGGGACCTCCTGCACAGGTGCTGCATGGCTGTCGTCAGCTCGTGTCGTGAG
ATGTTGGGTTAAGTCCCGCAACGAGCGCAACCCTCGCCTTTAGTTGCCAGCACGTTTGGGTGGGCAC
TCTAGAGGAACTGCCGGTGACAAGCCGGAGGAAGGTGGGGATGACGTCAAGTCCTCATGGCCCTTAT
GTCCTGGGCTACACACGTGCTACAATGGCGGTGACAGTGGGAAGCTAGATGGTGACATCGTGCCGAT
CTCTAAAAGCCGTCTCAGTTCGGATTGTACTCTGCAACTCGAGTACATGAAGGTGGAATCGCTAGTA
ATCGCGGATCAGCATGCCGCGGTGAATACGTTCCCGGGCCTTGTACACACCGCCCGTCACACCATGG
GAGTTGGTTTGACCCGAAGCCGGTGAGCGAACCGCAAGGACGCAGC

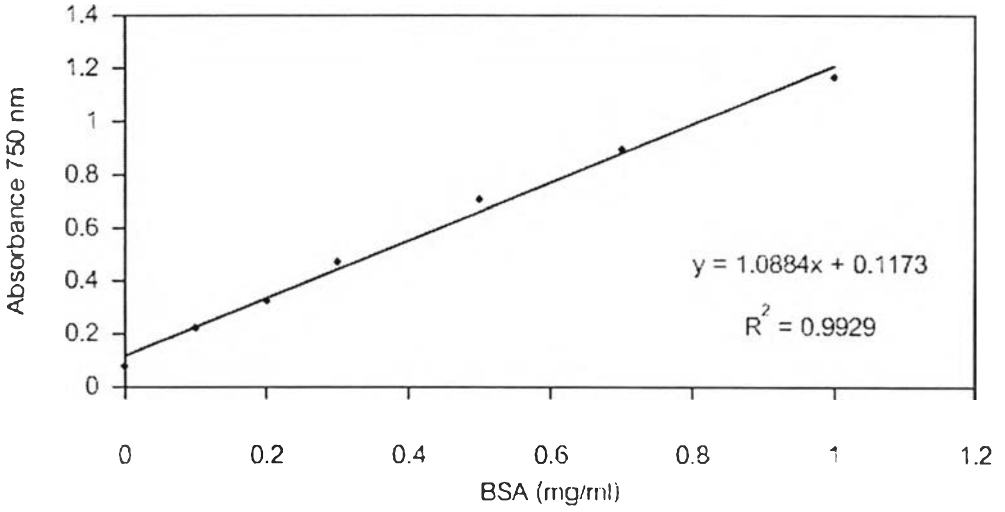
14. The 16S rDNA nucleotide sequence of strain CT8-1

AGCGAACGCTGGCGGCATGCTTAACACATGCAAGTCGCACGGACCTTTCGGGGTCAGTGGCGGACG
GGTGAGTAACGCGTAGGGATCTATCCATGGGTGGGGGATAACACTGGGAAACTGGTGCTAATACCG
CATGATGCCTGAGGGCCAAAGGCGCAAGTCGCCTGTGGAGGAGCCTGCGTTCGATTAGCTTGTTGGT
GGGGTAAAGGCCTACCAAGGCGATGATCGATAGCTGGTCTGAGAGGATGATCAGCCACWCTGGGAC
TGAGTCACGGCCCAGACTCCTACGGGAGGCAGCAGTGGGGAATATTGGACAATGGGCGCAAGCCTG
ATCCAGCAATGCCGCGTGTGTGAAGAAGGCGCATGATGCCTGAGGGCCAAAGGCGCAAGTCGCCTG
TGGAGGAGCCTGCGTTCGATTAGCTTGTTGGTGGGGTAAAGGCCTACCAAGGCGATGATCGATAGCT
GGTCTGAGAGGATGATCAGCCACACTGGGACTGAGACACGGCCCAGACTCCTACGGGAGGCAGCAG
TGGGGAATATTGGACAATGGGCGCAAGCCTGATCCAGCAATGCCGCGTGTGTGAAGAAGGTCTTCGG
ATTGTAAAGCACTTTCGACGGGGACGATGATGACGGACCCGTAGAAGAAGCCCCGGCTAACTTCGTG
CCAGCAGCCGCGGTAATACGAAGGGGATGACGGACCCGTAGAAGAAGCCCCGGCTAACTTCGTGCA
GCAGCCGCGGTAATACGAAGGGGGCTAGCGTTGCTCGGAATAACTGGGCGTAAAGGGCGCGTAGGC
GGTTTGGACAGTCAGATGTGAAATTCCTGGGCTTAACCTGGGGGCTGCATTTGATACGTACAGACTA
GAGTGTGAGAGAGGGTTGTGGAATTCCCAGTGTAGAGGTGAAATTCGTAGATATTGGGAAGAACAC
CGGTGGCGAAGGCTTTTCGGAAAGTAAAGCACTTTCGACGGGGACGATGATGATCGGCCCGTAGAA
GAAGCCCCGGCTAACTTCGTGCCAGCAGCCGCGGTAATACGAAGGGGGCTAGCGTTGCTCGGAATA
ACTGGGCGTAAAGGGCGCGTAGGCGGTTTGGACAGTCAGATGTGAAATTCCTGGGCTTAACCTGGGG
GCTGCATTTGATACGTACAGACTAGAGTGTGAGAGAGGGTTGTGGAATTCCCAGTGTAGAGGTGAAA
TTCGTAGATATTGGGAAGAACACCGGTGGCGAAGGCGGCAACCTGGCTCATGACTGACGCTGAGGC
GCGAAAGCGTGGGGAGCAAACAGGATTAGATACCCTGGTAGTCCACGCTGTAAACGATGTGTGCTG
GATGTTGGGCAACTTAGTTGCTCAGTGTCGTAGCTAACGCGCTAAGCACACCGCCTGGGGAGTACGG
CCGC

APPENDIX E

Standard curve of Bovine serum albumin (BSA) and Total acid

1. Standard curve of Bovine serum albumin (BSA)



2. Total acid (Helrich, 1990)

$$\text{Total acid (g/100ml)} = \frac{N \times V \times 60.1 \times 100}{1000 \times 10}$$

N = concentration of 0.1N NaOH

V = volume of 0.1N NaOH

APPENDIX F

Restriction size of *Acetobacter* and *Gluconobacter* type strains

Restriction of 16S-23S rDNA regions PCR product by digestion with five restriction endonucleases in *Acetobacter* and *Gluconobacter* type strains

strains	Molecular size of restriction fragments (bp) by digestion with				
	*Hpa*II	*Hae*III	*Bsp*1286I	*Mbo*II	*Ava*II
A. indonesiensis NBRC 16471^T	340, 390	370,570	-	-	-
A. cibinongensis NBRC 16605^T	350, 400	370, 590	-	-	-
A. lovaniensis NBRC 13753^T	495	325, 570	-	-	-
A. tropicalis NBRC 16470^T	390	350, 570	-	-	-
A. orientalis NBRC 16606^T	400, 500	350, 580	-	-	-
A. pasteurianus TISTR 1056^T	350, 530	345, 570	-	-	-
A. aceti NBRC 14818^T	400, 550, 900	340, 575	-	-	-
G. oxydans NBRC 14819^T	-	-	94, 125, 440	610	315
G. albidus NBRC 3250^T	-	-	94, 125, 440	190, 360	315
G. cerinus NBRC 3267^T	-	-	94, 125, 180, 250	171, 356	714
G. thailandicus NBRC 100600^T	-	-	51, 92, 125, 244	360	714
G. frateurii NBRC 3264^T	-	-	51, 92, 125, 244	360	610

Biography

Miss Jintana Kommanee was born on November 8, 1981 in Khon Kaen Province, Thailand. She received her Bachelor Degree of Biotechnology 2004 from Department of Biotechnology, Faculty of Science, King Mongkut's Institute of Technology Ladkrabang, Thailand.

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