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APPENDICES

APPENDIX A

1. Instruments

1. Waterbath, Gyromax^{TM}939XL, Amerex Instruments, Inc, USA.
2. Magnetic stirrer/hot plate 502P-2, Mettler Toledo, USA.
3. Refrigerated centrifuge 1920, Kubota, Japan.
4. Laminar flow, Lab service, Thailand.
5. Autoclave SS-325, Tomy, USA.
6. pH meter 8603, Mettler Toledo, Switzerland.
7. 4-digital balance AG204, Mettler Toledo, USA.
8. High Perforamnce Liquid Chromatography (HPLC), Agilent® 1100series, Agilent Technology Ltd, USA.
9. Hot air oven
10. Incubator
11. Rotary shaker
12. Microscope, Olympus CH30, Japan.
13. Scanning electron microscope
14. 2-digital balance, Mettler Toledo, USA.
15. 2-digital balance AG204, Sartorius, Germany.
16. Deep freezer, CFM209P6W0, White Consol Idated, USA.
17. Lyophilizer, Dura-dry, USA.

2. Chemical agents and enzymes

1. Sodium caseinate
2. Potassium nitrate (KNO_3), May & Baker, Ltd., Dagenham, England.
3. Sodium chloride (NaCl)
4. Calcium carbonate ($CaCO_3$), Difco, USA.
5. Dipotassium hydrogen orthophosphate (K_2HPO_4), Carlo, USA.
6. Magnesium sulfate ($MgSO_4.7H_2O$), Merck, Germany.

7. Diammonium sulfate ($(NH_4)_2SO_4$), J.T.Baker Chemicals B.V. Deventer, Holland.
8. Ferricsulfate heptahydrate($FeSO_4.7H_2O$), M&B, Thailand.
9. ($MnCl_2.4H_2O$)
10. Zincsulfate heptahydrate ($ZnSO_4.7H_2O$), M&B, Thailand.
11. Potassiumhydrogenphosphate tetrahydrate ($K_2HPO_4.3H_2O$), Merck, Germany.
12. Coppersulfate pentahydrate ($CuSO_4.5H_2O$), Merck, Germany.
13. Phenol, Carlo, USA.
14. N,N-dimethylformamide, Ajax, Australia.
15. Magnesiumcholride ($MgCl_2$), Sigma, USA.
16. Disodiumdihydrogenethylenediaminetetraacetatedihydrate (EDTA), Cica Kanto, Japan.
17. Tris, Wako, Japan.
18. Lysozyme, Wako, Japan

3. List name of tested strains

1. *Escherichia coli* ATCC 25922
2. *Pseudomonas aeruginosa* ATCC 27853
3. *Bacillus subtilis* ATCC 16633
4. *Staphylococcus aureus* ATCC 6538P
5. *Micrococcus luteus* ATCC 9341
6. *Candida albicans* ATCC 10231

4. Antibiotics

1. Novobiocin., sigma., Germany
2. Nistatin., sigma., Germany
3. Streptomycin., sigma., Germany

5. Media

1. Starch, Thailand.
2. Agar., Becton, Dickinson and Company, France.
3. Glucose, Sigma Chemical Co, USA.
4. Yeast extract., Becton, Dickinson and Company, France.
5. Malt extract, Becton, Dickinson and Company, France.
6. Oatmeal agar, Difco, USA.
7. Soluble starch., Difco, USA.
8. Skim milk., Difco, USA.
9. Muller-Hinton., Difco...
10. Sabouraud dextrose agar., ...
11. Peptone iron agar, Difco, USA.
12. Nutrient agar
13. Colloidal chitin
14. Meat extract, Merck, Germany.
15. Bacto peptone
16. Glycerol, Carlo, USA.
17. L-arabinose, Difco, USA.
18. D-xylose, Sigma, USA.
19. Mannitol, Difco, USA.
20. Fructose, Fluka, Switzerland.
21. Sucrose, Merck, Germany.
22. Rhamnose, Difco, USA.
23. Raffinose, Difco, USA.
24. Tryptone, Difco, USA.

1. Starch-casein nitrate agar

Starch	1.00	g
Sodium caseinate	0.03	g
KNO_3	0.20	g
Agar	1.50	g
Sea salt	100	ml
pH 7.0-7.4		

2. Yeast extract-malt extract agar (YMA), ISP medium no.2

Glucose	0.40	g
Yeast extract	0.40	g
Malt extract	1.00	g
Agar	1.50	g
Distilled water	100	ml
pH 7.3		

3. Oatmeal agar, ISP medium no.3

Oatmeal agar (Difco)	1.80	g
Distilled water	100	ml
pH 7.2		

4. Inorganic salt-starch agar, ISP medium no.4

Soluble starch (Difco)	10.00	g
K_2HPO_4 (anhydrous)	1.00	g
$MgSO_4.7H_2O$	1.00	g
NaCl	1.00	g
$(NH_4)_2SO_4$	2.00	g
$CaCO_3$	2.00	g
Pridham and Gottlieb trace salt (A)	0.10	g
Agar	1.50	g
Distilled water	100	ml

pH 7.0-7.4

Pridham and gottlieb trace salt (A)

$FeSO_4.7H_2O$	0.10	g
$MnCl_2.4H_2O$	0.10	g
$ZnSO_4.7H_2O$	0.10	g
Distilled water	100	ml

5. Glycerol-asparagine agar, ISP medium no.5

L-asparagine (anhydrous basis)	0.10	g
Glycerol	1.00	g
K_2HPO_4 (anhydrous basis)	0.10	g
Pridham and Gottlieb trace salt (A)	0.10	g
Agar	1.50	g
Distilled water	100	ml

6. Tyrosine agar, ISP medium no.7

Glycerol	1.50	g
L-Tyrosine	0.05	g
L-Asparagine	0.10	g
$K_2HPO_4.7H_2O$ (anhydrous basis)	0.05	g
$MgSO_4.7H_2O$	0.05	g
NaCl	0.05	g
$FeSO_4.7H_2O$	0.01	g
Pridham and Gottlieb trace salt (A)	0.10	ml
Agar	1.50	g
Distilled water	100	ml

pH 7.2-7.4

7. Carbon utilization test medium, ISP medium no.9

Basal mineral salt agar

Carbohydrate	1.00	g

$(NH_4)_2SO_4$	0.264	g
K_2HPO_4 (anhydrous)	0.238	g
$K_2HPO_4.3H_2O$	0.565	g
$MgSO_4.7H_2O$	0.10	g
Pridham and gottlieb trace salt (B)	0.10	ml
Agar	1.50	g
Distilled water	100	ml
pH 6.8-7.0		
Pridham and Gottlieb trace salt (B)		
$CuSO_4.5H_2O$	1.00	g
$FeSO_4.7H_2O$	0.11	g
$MnCl_2.4H_2O$	0.79	g
$ZnSO_4.7H_2O$	0.15	g
Distilled water	100	ml

8. Skim milk

Skim milk (Difco)	10.00	g
Distilled water	100	ml

9. Muller-Hinton medium (MHA)

Muller-Hinton (Difco)	3.40	g
Distilled water	100	ml
pH 7.3		

10. Sabouraud's dextrose agar (SDA)

Sabouraud dextrose agar	3.00	g
Distilled water	100	ml
pH 5.6-5.8		

11. Seed medium

Yeast extract	0.40	g

Glucose	0.40	g
Malt extract	1.00	g
Distilled water	100	ml
pH 7.3		

12. Production medium

Yeast extract	0.40	g
Glucose	0.40	g
Malt extract	1.00	g
$CaCO_3$	0.10	g
Distilled water	100	ml
pH 7.3		

13. Peptone-yeast extract iron agar

Peptone iron agar (Difco)	3.60	g
Yeast extract	0.10	g
Distilled water	100	ml
pH 7.0-7.2		

14. Nutrient agar (NA)

Nutrient agar (Difco)	2.30	g
Distilled water	100	ml

15. Colloidal chitin agar

Colloidal chitin	0.10-0.25	g
Agar	1.50	g
Distilled water	100	ml

16. Basal medium

Glucose	10.00	g
$MgSO_4.7H_2O$	0.50	g
NaCl	0.50	g

$FeSO_4.7H_2O$	0.01	g
K_2HPO_4	1.00	g
Agar	12.00	g
Distilled water	1000	ml
pH 7.0		

17. Nitrate agar

Beef extract	3.00	g
Bacto peptone	5.00	g
KNO_3	2.00	g
Agar	5.00	g
Distilled water	100	ml
pH 7.0		

All media were sterilized in an autoclave (121°C, 15 lb/inc^2) for 15 minutes except carbon utilization test media which were sterilized at 121°C, 10 lb/inc^2 for 10 minutes.

APPENDIX B

REAGENTS AND BUFFERS

1. 6N HCl

Conc. HCl	60	ml
Distilled water	60	ml

Add conc. HCl into the distilled water

2. Ninhydrin solution

Ninhydrin	0.30	g
1-Butanol	100	mL
Glacial acetic acid	3	mL

3. Nitrate reduction test reagent

Sulphanilic acid solution

Sulphanilic acid	0.80	g
5N acetic acid	100	mL

Disslove by gentle heating in a fume hood

N,N-dimethyl-1-*naphthylamine solution*

N,N-dimethyl-1-*naphthylamine*	0.50	g
5N acetic acid	100	mL

Disslove by gentle heating in a fume hood

Adding two drops of sulphanilic acid solution and 3 drops of *N,N*-dimethyl-1-naphthylamine solution into nitrate agar inoculing with the test microorganisms.

4. 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.

5. 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 adjust 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.

6. 3M sodium acetate pH5.2

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

7. 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. Sterilization is not required for the preparation of this stock solution.

8. 20x SSC

3M NaCl

0.1 M Tri-sodiumcitrate

The 20x SSC was adjusted the pH 7.0 with 1N NaOH. The solution was sterilized by autoclaving for 15 minutes at 15 lb/in^2.

9. 1M Tris-HCl pH 8.0

The 1M Tris was prepared by dissolving 12.1 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 volumn of the solution was adjusted to 1 litter with distilled water and sterilized by autoclaving.

10. RNase A solution

RNase A	2	mg
0.15 M NaCl	10	mL

Dissolved 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.

11. RNase T_1 solution

RNase T_1	80	μL
0.1M Tris-HCl pH 7.5	10	mL

Mix 80 μL of RNase T_1 in 10 mL of 0.1M Tris-HCl pH 7.5 and heat at 95°C for 5 min. Keep RNase T_1 solution in -20°C.

12. Proteinase K

Proteinase K	4	mg
50mM Tris-HCl pH 7.5	1	mL

Use freshly prepared solution

13. Nuclease P_1 solution

Nuclease P_1	0.1	mg
40 mM CH_3COONa+12mM $ZnSO_4$ (pH5.3)	1	mL

Store at 4°C

14. Alkaline phosphatase solution

Alkaline phosphatase	2.4	units
0.1 M Tris-HCl (pH8.1)	1	mL

15. 0.1 M Tris-HCl buffer, pH 9

Tris	1.21	mg
Distilles water	100	mL

16. TE buffer

10 mM Tris HCl (pH8.0)

1mM Na_2-EDTA (pH8.0)

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. Ethidium bromide solution (10 mg/mL)

The Ethidium bromide solution was prepared by dissolving 1 g of ethidium bromide in 100 mL of distilled water. The solution was stored in light-tight container at room temperature.

20. Gel loading buffer

0.025 g of bromophenol blue was dissolved in 20 mL of 15% glycerol.

21. Tris-boric EDTA (TBE) buffer

1xTBE buffer was used as an electrophoresis buffer throughout the study. The working solution of 1xTBE buffer was prepared from stock solution of 5xTBE buffer, as followed.

Tris-base	5.4	g
Boric acid	2.75	g
Na_2-EDTA	0.47	g
Distilled water	100	mL

22. Agarose gel

Agarose	1.6	g
1xTBE buffer	200	mL

APPENDIX C

Primers and nucleotide sequences of the PCR amplified 16S rDNA

1. List of primers for 16S rDNA PCR amplification and sequencing

27F	5'-GTTTGATCCTGGCTCAG-3'
530F	5'-GTGCCAGC[C/A]GCCGCGG-3'
1114F	5'-GCAACGAGCAGAACCC-3'
357R	5'-CTGCTGCCTCCCGTAT
802R	5'-TAAACCAGCTGGTTTACTTGGAACAGTTTTTAACATTGTT-3'
1115R	5'-AGGGTTGCGCTCGTTG-3'
1541R	5'-AAGGAGGTGATCCAGCC-3'

2. Nucleotide sequences of the PCR amplified 16S rDNA

PCR amplified 16S rDNA nucleotide sequence of SAM2-1 (1,540 bp)

TCTCCATAAAAAAATTTTTGTTCCAGACCGCCCGATTGAATTTGATCCTGGCTCAGGACGAACGCTGGC
GGCGTGCTTAACACATGCAAGTCGAACGAAGAAATCCGCTTCGGTGGTGGATTAGTGGCGAACGGGTGA
GTAACACGTGGGCAATCTGCCCTTTCACTCTGGGACAAGCCCTGGAAACGGGGTCTAATACCGGATACC
ACTTCGTCCCGCATGGGACGGGGTTGAAAGCTCCGGCGGTGAAGGATGAGCCCGCGGCCTATCAGCTTG
TTGGTGGGGTAATGGCCTACCAAGGCGACGACGGGTAGCCCGCCCTGAGAGGGCGACCGCCCACACGGG
GACTGAGACACGGCCCCAGACTCCTACGGGAGGCAGCAGTGGGGAATATTGCACAATGGGCGAAAGCCT
GATGCAGCGACCCCCCCTGAAGGGATAACGCCCTTCGGGGTTGTAAACCTCTTTTCAGCAGGGAAGAAG
CGCAAGTGACGGTACCTGCAGAAGAAGCGCCGGCTAACTACGTGCCAGCAGCCGCGGTAATACGTAGGG
CGCAAGCGTTGTCCGGAATTATTGGGCGTAAAGAGCTCGTAGGCGGCTTGTCACGTCGGATGTGAAAGC
CCGGGGCTTAACCCCGGGTCTGCATTCGATACGGGCTAGCTAGAGTGTGGTAGGGGAGATCGGAATTCC
TGGTGTAGCGGTGAAATGCGCAGATATCAGGAGGAACACCGGTGGCGAAGGCGGATCTCTGGGCCATTA
CTGACGCTGAGGAGCGAAAGCGTGGGGAGCGAACCAGGAATAGATACCCTTGGTAGTCCACCCCGTAAA
CGTTGGGAAATAGGTGTTGGGCGACATTTCCACGTCGTCGGTGCCCGCAGCTAACGCATTAAGTTCCCC
GCCTGGGGAGTACGGCCGCAAGGCTAAAACTCAAAGGAATTGACGGGGGCCCGCACAAGCAGCGGAGCA
TGTGGCTTAATTCGACGCAACGCGAAGAACCTTACCAAGGCTTGACATATACCGGAAAGCATCAGAGAT
GGTGCCCCCCTTGTGGTCGGTATACAGGTGGTGCATGGCTGTCGAAAACAGCTCGTGGAGTGAAGATGT
TGGGTTAAGTCCCGCAACGAGCGCAACCCTTGTTCTGTGTTGCCAGCATGCCCTTCGGGGTGATGGGGA
CTCACAGGAGACTGCCGGGTCAACTCGGAGGAAGGTGGGGACGACGTCAAGTCATCATGCCCCTTATGT
CTTGGGCTGCACACGTGCTACAATGGCCGGTACAATGAGCTGCGATGCCGCGAGGCGGAGCGAATCTCA
AAAAGCCGGTCTCAGTTCGGATTGGGGTCTGCAACTCGACCCCATGAAGTCGGAGTTGCTAGTAATCGC
AGATCAGCATTGCTGCGGTGAATACGTTCCCGGGCCTTGTACACACCGCCCGTCACGTCACGAAAGTCG
GTAACACCCGAAGCCGGTGGCCCAACCCCTTGTGGGAGGGAGGCTGTCGAAGGTGGGACTGGCGATTGG
GAAAATCCTTAGGAACCTACCG

PCR amplified 16S rDNA nucleotide sequence of B15-4-1 (1,502 bp)

TTTGAGTTTATGTACCCCTGGCTCCAGGACGAACGCTGGCGGCGTGCTTAACCACATGCCAAGTCCAAC
GATGAAGCCCCTTCCGGTGGTGGATTTAGTGCCGAACGGGTGAAGTAACACGTGGCCAATCTGCCCTTC
ACTCTGGGACAAGCCCTGGAAACGGGGTCTAATACCGGATAATACTCCCTCCCTGCATGGGTGGGGGTT
GAAAGCTCCCGGCGGTGAAGGATGAGCCCGCGGCCTATCAGCTTGTTGGTGGGGTAATGGCCTACCAAG
GCGACGACGGGTAGCCGGCCTGAGAGGGCGACCGGCCACACTGGGACTGAAACACGGCCCCAGACTCCT
ACGGGAGGCAGCAGTGGGGAATATTCCACAATGGGCGAAAAGCCTGATGCAGCGACCCCGCGTGAGGAA
TAACGCCTTCCGGGTTGTAAACCTCTTTTCAGCAGGGAAGAAGCCCAAGTGACGGTACCTGCAGAAGAA
GCGCCGGCTAACTACGTGCCAGCAGCCGCGGTAATACGTAGGGCGCAAGCGTTGTCCGGAATTATTGGG
CGTAAAGAGCTCGTAGGCGGCTTGTCACGTCGGATGTGAAAGCCCGGGGCTTAACCCCGGGTCTGCATT
CGATACGGGCTAGCTAGAGTGTGGTAGGGGAGATCGGAATTCCTGGTGTAGCGGTGAAATGCGCAGATA
TCCAGGAGGAACACCGGTGGCGAAGGCGGATCTCTGGGCCATTACTGACGCTGAGGAGCGAAAGCGTGG
GGAGCGAACAGGATTAGATACCCTGGTAGTCCACGCCGTAAACGTTGGGAACTAGGTGTGGGCGACATT
CCACGTCGTCGGTGCCGCAGCTAACGCATTAAAGTTCCCCGCCTGGGGAGTACGGCCGCAAGGCTAAAA
CTCAAAGGAATTGACGGGGGCCCGCACAAGCAGCGGAGCATGTGGCTTAATTCGACGCAACGCGAAGAA
CCTTACCAAGGCTTGACATATATCGGAAAGCATCAGAGATGGTGCCCCCCTTGTGGTCGGTATACAGGT
GGTGCATGGCGGTCGAAACAGCTCGTAGTCGTGAGATGTTGGGTTAAGTCCCGCAACGAGCGCAACCCT
TGTTCTGTGTTGCCAGCATGCCTTTCGGGGTGATGGGGACTCACAGGAGACTGCCGGGTCAACTCGGAG
GAAGGTGGGGACGACGTCAAGTCATCATGCCCCTTATGTCTTGGGCTGCACACGTGCTACAATGGCCGG
TACAATGAGCTGCGATGCCGTGAGGCGGAGCGAATCTCAAAAAGCCGGTCTCAGTTCGGATTGGGGTCT
GCAACTCGACCCCATGAAGTCGGAGTTGCTAGTAATCGCAGATCAGCATTGCTGCGGTGAATACGTTCC
CGGGCCTTGTACACACCGCCCGTCACGTCACGAAAGTCGGTAACACCCGAAGCCGGTGGCCCAACCCCT
TGTGGGAGGGAGCTGTCGAAGGTGGGACTGCCGATTGGGGAAAATCCTTGAGGA

PCR amplified 16S rDNA nucleotide sequence of SMP3-1 (1,070 bp)

ATAGCCACACAAGCCAGCGTTGATCCGGAATTATTGGGCGCTAAAGAGCTCGTAGGCGGCTTGTCGTCG
GTTGTGAAAGCCCGGGGCTTAACCCCGGGTCTGCAGTCGATACGGGCAGGCTAGAGTTCGGTAGGGGAG
ATCGGAATTCCTGGTGTAGCGGTGAAATGCGCAGATATCAGGAGGAACACCGGTGGCGAAGGCGGATCT
CTGGGCCGATACTGACGCTGAGGAGCGAAAGCGTGGGGAGCGAACAGGATTAGATACCCTGGTAGTCCA
CGCCGTAAACGGTGGGCACTAGGTGTGGGCAACATTCCACGTTGTCCGTGCCGCAGCTAACGATTAAGT
GCCCCGCCTGGGGAGTACGGCCGCAAGAGTAAAACTCAAAGGAATTGACGGGGGCCCGCACAAGCGGCG
GACATGTGGCTTAATTCGACGCAACGCGAAGAACCTTACCAAGGCTTGACATACACCGGAAAGCATCAG
AGATGGTGCCCCCCTTGTGGTCGGTGTACAGGTGGTGCATGGCTGTCGTCAGCTCTGTCGTGAGATGTT
GGTTAATCCCGCAACGAGCGCAACCCTTGTACCCGTGTTGCCAGCAACTCTTCAGAAGGTTGGGGACTC
ACGGGAGACCGCCGGGGTCAACTCGGAGGAAGGTGGGGACGACGTCAAGTCATCATGCCCCTTATGTCT
TGGGCTGCACACGTGCCTACAATGGTCCGGTACAATTGAGCTGCGATACCCGCATAGATGGAGCGAATC
TCAATAAAGCCGGTCCTCAGTTTCGGAATTGGGGTCTGCAACTCGACCCCATGAAAATCCGAATCGCTA
GTAATCGAAAATCAGCATTGCTGCAGATGAATACATTCCCGGGCCTTGTACACACCGCCCGTCACGTCA
CGAAAGTCGGTAACACCCGAAAGCCAGTGGCCCAACCCCTTGTGGGAAAGAAGCTAGTCGAAGGTGGGA
CTGGCGATTGGGACATAAGTCGTAACAAGGTAACCGTAAATTATTCACAACAGTATATCCGTGTACTTT
CAATTTTACAGGAAACATTTCATGTTATTATATTC

PCR amplified 16S rDNA nucleotide sequence of D10-1 (1,542 bp)

TTTGAGTTTTGTCCTGGCTCAGGACGAACGCTGGCGGCGTGCTTAACACATGCAAGTCGAACGATGAAC
CACTTCGGGTGGGGATTAAGTGGCGAAACGGGTGAATAAACACGGTGGCCAATCTCCCCTTGCACTCTG
GGACAAGCCCTGGAAAACGGGGTTCTAATACCGGAATACTGACCTTCACGGGCATTCTGTGAGGGTCAA
AAGCTCCGGGCGGTGCAGGATGAACCCCGCCGCCTTATCAACTTTGTTGGGTGAGGAAACGGCTCACCC
AAGGCGAACGACGGGTAGCCGGCCTTGAGAGGGCGACCGCCCAACACTGGAAATGAGACACGGCCCCAG
ACTCTTACGGGAGGCAGCAGTGGGGAATATTCCACAATGGGGAAACCCTGATGCAGCGACCCCCGCCTT
GAGGGATGACCGCCTTTCGGGTTGTAAACCTCTTTNCACCAGGGAAGAAAGCAAAAGTGACGGTACCTT
GCAAAAAAAGCGCCGGCTAACTTACGTCCCAGCAGCCGCGGTAATACGTAGGGCGCAAGCGTTGTCCGA
AATTATTGGGCGTAAAAGAGCTCGTAGGCGGCTTGTCACGTCGGTTGTAAAAGCCCGGGGCTTTAACCC
CGGGTCTGCAGTCGATACGGCCAGGCTAGAGTTCGGTAGGGGAGATCGGAATTCCCTGGTGTAGCGGTG
AAATGTCGCAGATATGCAGGAGGAACACCGGTGGCGAAGGCGGATCTCTGGCCCTTTGGAAACCTCACG
TTGAGGAGCGAAAGCGTGGTCGGAGCGAACAGGATTAGATACCCTGGTAGTCCACGCCGTAAACGGTGG
GCACTAGGTGTGGGCAACATTCCACGTTGTCCGGTCCCGCAAGCTTAACGCCCATTAAAGTGCCCCCCC
CTGGGGAGTACCGCCCCCCCAAGGCNTAAAACTTCAAAGGAATTGACGGGGGCCCCGCCACAAGCGGCG
GAAGCATGTTGGCTTAATTCGGACCCAACCGCGAAGAACCCTTTACCAAGGCTTAACAAACACCGGAAA
ACGTCCAAAAGATGGGCCCCCCCTTGGTGGTCGGTGTACAGGTGGGTGCATGGCTGTCGTAAGCTCCTG
TCGAAAGATGTTGGTATCAAACCCGCAACGAGCCCAACCTTTTCCGTGTTGCCAGCAGCCCTTTGTGGT
GCTGGGGACTCACGGGAGACCGCCGGGTCAACTCGGAGGAAGGTGGGGACGACGTCAAGTCATCATGCC
CCTTATGTTTTGGGCTGCACACGTTGCTACAATGGCCGGTACAATGAGCTGCGATACCGCAAGGTGGAG
CGAATCTCAAAAAGCCGGTCTCAGTTCGGATTGGGGTCTGCAACTCGACCCCATGAAGTCGGAGTCGCT
AGTAATCCGCAGATCAGCATTGCTGCGGTGAATACGTTCCCGGGCCTTGTACACACCGCCCGTCACGTC
ACGAAAGTCGGTAACACCCGAAGCCGGTGGCCCAACCCCTTGTGGGAGGGAGGTGTCGAAGGTGGACTG
CCCTTGGAAACCCTTGAGATTTCG

PCR amplified 16S rDNA nucleotide sequence of D10-5 (1,411 bp)

CCCCTTTCGGGCGGAATAATTACCCTTCGGTTTAAAACTTGTTGGATGCGCCAGAATTAAAAGGGGGCG
CGAAAGAAGATGGGGGGATATGACCGGCAGGGGTTAAGGTTGGGGGGTCGGTCGTCCCAAAATAGCCGG
GGGGGTCATGGGGGGGGAAATCCTCACCAAAACCACGACGCTTAGCCGCCCTTAGAGGGCGACCGCCCA
CACTGTGATTGAGACACGGCCCATCTCCTACGGGAGGCAGCAGTGGGGAATATTGCACAATGGGCGAAA
GCCTGATGCAAGCGAACCGCCGCGTGAGGGATGACGGCCTTCGGGTTGTAAACCTCTTTCCAGCAGGGA
AGAAGCGAAAGTGACGGTACCTCCAGAAGAAGCGCCGGCTAACTACGTGCCAGCAGCCGCGGTAATACG
TAGGGCGCAAGCGTTGTCCGGAATTATTGGGCGTAAAGAGCTCGTAGGCGGCTTGTCGCGTCGGTTGTG
AAAGCCCGGGGCTTAACCCCGGGTCTGCAGTCGATACGGGCAGGCTAGAGTTCGGTAGGGGAGATCGGA
ATTCCTGGTGTAGCGGTGAAATGCGCAGATATCAGGAGGAACACCGGTGGCGAAGGCGGATCTCTGGGC
CTAGGCAACCTACTTGAAGCTCCACCGGAGCGAAAGCGTGGGGAGCGAACAGGATTAGATACCCTGGTA
GTCCACGCCGTAACGGTGGCCCTAGGTGTGGGCAACATTCCACGTTGTTCCGTGCCCGCCAGCTAAACG
CATTAAAGTCCCCCCCCCTGGGGAGTACGGCCCCCAAGGGCTAAAACTCAAAGGAATTGACGGGGGCCC
GCCACAAGCGGCGGAGCATGTGGCTTAATTCGACGCAACGCGAAGAACCTTACCAAGGCTTGACATACA
CCGGAAAGCATCAGAGATGGTGCCCCCCTTGTGGTCGGTGTACAGGTGGTGCATGGCTGTGCGTAAGCT
CGTGTCGTGAGAATGTTTGGATCTAAGTCCCCGCAACGAGCGCAACCCTTGTCCCGTGTTCCCAGCAAC
TCTTCGGAGGTTGGGGACTCCACGGGAGACCGCCGGGTCAACTCGGAGGAAGGTGGGGACGACGTCAAG
TCATCATGCGCCTTATGTCTTGGGCTGCACACGTGCTACAATGGCCGGTACAATGAGCTGCGATACCGC
AAGGTGGAGCGAATCTCAAAAAGCCGGTCTCAGTTCGGATTGGGGTCTGCAACTCGACCCCATGAAGTC
GGAGTCGCTAGTAATCGCAGATCAGCATTGCTGCGGTGAATACGTTCCCGGGCCTTGTACACACCGCCC
GTCACGTCACGAAAGTCGGTAACACCCGAAGCCGGTGGCCCAACCCCTTGTGGGAGGGAGCTGTCGAAG
GTGGGACTCGCTTGAATCCTTTGAGCCCCCC

PCR amplified 16S rDNA nucleotide sequence of J8-1 (1,088 bp)

TTTGAGTTTTGTCCTGGCTCAGGACGAACGCTGGCGGCGTGCTTAACACATGCAAGTCGAACGATGAAT
CCGGTTTTCGGCCGGGGGATTTAGTGGGCGAACGGGTTGAGTAACACGTGGGGCAATCTGCCCCTGCAC
TCTTGGGAACAAGCCCCTGGAAACGGGGGTCTAATACCGGGATAAGGACTGCCGGACCCCATGGTCTGG
TGGTGGAAAAAGCTCCGGCGGGTGCAGAATGAACCCCGCGGCCTTATCAGCTTGTGGGTGGGGGTGATG
CCCTACCAAGGCGACGACGGGTAGCCGCCCTGAGAGGGCGACACGCCCCCACTTGGGAATGAGACACGG
CCCCAGACTCTTACGGAGGCAGCAGTGGGGAATATTGCACAATGGGCGCAAGCCTGATGCAGCGACCCC
CGCGTGAGGAATGACGCCCTTCGGGTTGTAAACCTTCTTTCACCAGGAAAGAAGCGTGAGTGACGGTAC
CTGCAGAAGAAGCGCCGGCTAATTACGTGCCAGCAGCCGCGGTAATACGTAGGGCGCAAGCGTTGTCCG
GAATTATTGGGCGTAAAGAGCTCGTAGGCGGCTTGTCGCGTCGGATGTGAAAGCCCGGGGCTTAACTCC
GGGTCTGCATTCGATACGGGCAGGCTAGAGTTCGGTAGGGGAGATCGGAATTCCTGGTGTAGCGGTGAA
ATGCGCAGATATCAGGAGGAACACCGGTGGCGAAGGCGGATCTCTGGGCCGATACTGGTAAACGCTGAG
TGAGCGAAAGCGTGGGTTGAGCGAACAGGATTAGATACCCTGGTAGTCCACGCCGTAAACGTTGGGAAC
TAGGTGTGGGCGACATTCCACGTTGTCCGTGCCGCAGCTAACGCATTAAGTTCCCCGCCTGGGGAGTAC
GGCCGCAAGGCTAAAACTCAAAGGAATTGACGGGGGCCCGCACAAGCGGCGGAGCATGTGGCTTAATTC
GACGCAACGCGAAGAACCTTACCAAGGCTTGACATACACCGGAAACATCCAGAGATGGGTGCCCCCTTG
TGGTCGGTGTACAGGTGGTGCATGGCTGTGGTAAGCTCTCGGAAATTTGGTAT

PCR amplified 16S rDNA nucleotide sequence of J17-2 (1,528 bp)

TTTGAGTTTTGTCCTGGCTCAGGACGAACGCTGGCGGCGTGCTTAACACATGCAAGTCGAACGATGAAC
CACTTCCGTGGGGATTAGTGCCGAACGGGGTGAGTAACACGTGGGCAATCTCCCCTTCCACTCTGGGAC
AACCCCTGGAAACGGGGTCTTAATACCGAATAACCACTGCGGATCGCATGGTCTGCGGTTAAAAGCTCC
GGCGGTGAAGGAAGAGCCCGCGCCCTATCAGCTTGTTGGTGAGGTAATGGCTCACCAAGGCGACGACGG
GTAGCCGCCCTGAGAGGGCGACACGCCCACACTGGAATTGAGACACGGCCCAGACTCTTACGGGAGGCA
GCAGTGGGGAATATTGCACAATGGGCGAAAGCCTGATGAAAGCGAACCCCGCCTGAAGGAATAACGGCC
TTCGGGTTGTAAACCTTCTTTCAGCAGGGAAGAAAGCAAAAGTGACGGTACCTGCAAAAGAAGCGCCGG
CTAAATTACGTGCCAGCAGCCGCGGTAATACGTAGGGCGCAAGCGTTGTCCGGAATTATTGGGCGTAAA
GAGCTCGTAGGCGGCTTGTCACGTCGATTGTGAAAGCCCGAGGCTTAACCTCGGGTCTGCAGTCGATAC
GGGCTAGCTAGAGTTCGGTAGGGGAGATCGGAATTCCTGGTGTAGCGGTGAAATGCGCAGATATCAGGA
GGAACACCGGTGGCGAAGGCGGATCTCTGGGCCTTGATAACTGACTGCCTTGAGGACTCCGCGAAAGCG
TGGGGAGCGAACAGGATTAGATACCCTGGTAGTCCACGCCGTAAACGGTGGGCACTAGGTGTGGGCAAC
ATTCCACGTTGTTCCCGTGCCCCCAAGCTAACGCCATTAAAGTGCCCCCCCCTGGGGGAGTACGGCCCG
CAAGGCTTAAAACTCAAAGGAATTGAGCGGGGGCCCCGCAACAAGCGGGCGGAAGCATGTGGCTTAATT
CGGACCGCAACGCGGAAGAACCTTTACCCAAGGCTTGAACATACACCGGAAAAGCATCAGAGATGGTGC
CCCCCTTTGTGGTCGGTGTACCAGGTGGTGCATGGCCTGTCGTAACCTCGTGTCGGTAAGATGTTGGTA
TTAATTCCCGCAACGAGCGCAACCTTTGTCCCGTGTTGCCAGCAGGCCCTTGTGTGTGGGGACTCACGG
GAGACCCCGGGGTCAACTCGGAGGAAGGTGGGGACGACGTCAAGTCATCATGCCCCTTATGTCTTGGGC
TGCACACGTGCTACAATGGCCGGTACAATGAGTTGCGATACCGTGAGGTGGAGCGAATCTCAAAAAGCC
GGTCTCAGTTCGGATTGGGGTCTGCAACTCGACCCCATGAAGTCGGAGTCGCTAGTAATCGCAGATCAG
CATTGCTGCGGTGAATACGTTCCCGGGCCTTGTACACACCGCCCGTCACGTCACGAAAGTCGGTAACAC
CCGAAGCCGGTGGCCCAACCCCTTGTGGGAGGGAGTGTCGAAGGTGGACTCGCTTTGGAATCCCTTTGA
GAGCCCCCCC

VITA

Miss Sirikan Hunadanamra was born on April 14, 1982 in Udonthani, Thailand. She received her Bachelor's degree of Science in Biology in 2003 from the Faculty of Science, Mahidol University, Thailand. At present, she is a faculty member in Master's degree of the Faculty of Science, Chulalongkorn University, Bangkok, Thailand.