APPENDIX A
PROXIMATE ANALYSIS

A.1 Moisture Content (AOAC, 1999)

Method

1. Dry the empty dish and lid in the oven at 105°C for 6 h and transfer to desiccator to cool (30 min). Weigh the empty dish and lid.
2. Weigh about 5 g of sample to the dish. Spread the sample with spatula.
3. Place the dish with sample in the oven. Dry for 16 h or overnight at 105°C.
4. After drying, transfer the dish with partially covered lid to the desiccator to cool. Reweigh the dish and its dried content.

Calculation

$$\% \text{ Moisture} = \frac{(W_1 - W_2) \times 100}{W_1}$$

Where: W_1 = weigh (g) of sample before drying

W_2 = weigh (g) of sample after drying

A.2 Ash Content (AOAC, 1999)

Method

1. The crucible and lid is firstly placed in the furnace at 550°C overnight to ensure that impurities on the surface of crucible are burn off. Cool the crucible in the desiccator (30 min).
2. Weigh the crucible and lid to 3 decimal places.
3. Weigh about 5 g sample into the crucible. Heat over low bunsen flame with lid half covered. When fumes are no longer produced, place crucible and lid in furnace.
4. Heat at 550°C overnight. During heating, do not cover the lid. Place the lid on after complete heating to prevent loss of fluffy ash. Cool down in the desiccator.

5. Weigh the ash with crucible and lid until turning to gray. If not, return the crucible and lid to the furnace for further ashing.

Calculation

$$\% \text{ Ash} = \frac{\text{Weigh of ash (g)} \times 100}{\text{Weigh of sample (g)}}$$

A.3 Protein Content (AOAC, 1999)

Reagents

1. Kjedahl catalyst: Mix 9 part of potassium sulphate (K_2SO_4) anhydrus, Nitrogen free with 1 part of copper sulphate ($CuSO_4$)
2. Sulfuric acid (H_2SO_4)
3. 40% NaOH solution (w/v)
4. 0.02N HCl solution
5. 4% H_3BO_3 solution (w/v)
6. Indicator solution: Mix 100 ml of 0.1% methyl red (in 95% ethanol) with 200ml of 0.2% bromocresol green (in 95% ethanol).

Method

1. Place sample (0.5-1.0 g) in digestion flask.
2. Add 5 g Kjeldahl catalyst, and 200 ml of conc. H_2SO_4.
3. Prepare a tube containing the above chemical except sample as blank.
4. Place flasks in inclined position and heat gently until frothing ceases. Boil briskly until solution clears. Cool sample to a room temperature.
5. Place 250 ml-flask containing 50ml of 2% boric acid and a few drops of an indicator in the distillation unit with a tip of the condenser extending below the surface of acid solution.
6. Connect the digestion tube to the distillation unit. Heat until all NH_3 has distilled.

7. Remove receiver, wash tip of condenser, and titrate excess standard acid in distilled with standard NaOH solution.

Calculation

$$\% \text{ Protein} = \frac{(A-B) \times N \times 1.4007 \times 6.25}{W}$$

Where: A = volume (ml) of 0.02N HCl used sample titration
B = volume (ml) of 0.02N HCl used in blank titration
N = Normality of HCl
W = weigh (g) of sample
14.007 = atomic weigh of nitrogen
6.25 = the protein-nitrogen conversion factor

A.4 Fat Content (AOAC, 1999)

Reagents

1. Petroleum ether

Method

1. The bottle and lid is firstly placed in the incubator at 105°C overnight to ensure that weight of bottle was stable.
2. Weigh about 3-5 g of sample to paper filter and wrap.
3. Take the sample into extraction thimble and transfer into soxhlet
4. Fill petroleum ether about 250 mL into the bottle and take it on the heating mantle.
5. Connect the soxhlet apparatus and turn on the water to cool them and then switch on the heating mantle.
6. Heat the sample about 14 h. (heat rate of 150 drop/min).
7. Evaporate the solvent by using the vacuum condenser.
8. Incubate the bottle at 80-90 °C until solvent was completely evaporated and bottle was completely dry.
9. After drying, transfer the bottle with partially covered lid to the desiccator to cool. Reweigh the bottle and its dried content.

Calculation

$$\% \text{ Fat} = \frac{\text{Weigh of fat} \times 100}{\text{Weigh of sample}}$$

A.5 Chitin Content

Extraction of chitin

1. Cold 0.25 M HCl (300 ml) was added to 50.0 g thawed shrimp shells (not dried). This extraction was allowed to proceed for 5 min on ice.
2. The suspension was then filtered and additional 300 ml of cold 0.25 M HCl was added to the pellet. The supernatant was kept for later analysis.
3. After 35 min of cold extraction the suspension was filtered again. The supernatant was combined with the first one and the pellet was washed with water (300 ml).
4. The suspension was then filtered and the water from the washing procedure was added to the acid supernatants. The exact total volume of this acid extract was noted.
5. The extract was kept in a cold room until the content of calcium carbonate was determined by an Atomic Absorption Spectrophotometer.
6. The final pellet from the demineralisation step was extracted with NaOH (1 M, 100 ml) at 95 °C for 2 h.
7. The suspension was then cooled to room temperature, filtered and the pellet was extracted again under the same conditions (1 M NaOH, 100 ml, 95 °C) for 2 h.
8. The same filtering procedure was then repeated one more time and the final alkaline extraction was allowed to proceed for 1 h.
9. The extract was cooled to room temperature, filtered and washed with water until neutrality was achieved.
10. The pellet was finally washed with ethanol (96%) and dried at 80 °C. The content of chitin was determined gravimetrically.

APPENDIX B

MEDIA COPOSITION

B.1 Colloidal Chitin Agar Medium (Gomez et al., 2004)

Triammonium citrate	0.625	g
NaCl	0.250	g
KH_2PO_4	0.375	g
$MgSO_4.7H_2O$	0.125	g
Na_2CO_3	0.375	g
Agar	15	g
Colloidal chitin	20-50	g (wet weight)
Distilled water	1.0	l

pH 6.5 – 7.0

B.2 Nutrient Agar Medium (Waksman, 1961)

Peptone	5.0	g
Beef extract	3.0	g
Sodium chloride	5.0	g
Agar	15.0	g
Distilled water	1.0	l

pH 6.8 – 7.2

B.3 Bennets Agar (BNA) (Modi, 1993)

Glucose	10.0	g
Tryptone	1.0	g
Meat extracts	1.0	g
Yeast extracts	1.0	g

Agar	30.0	g
Distilled Water	1.0	l
pH 8		

B.4 Potato Dextrose Agar Medium (PDA) (Okon et al., 1977)

Potato	200.0	g
Glucose	20.0	g
Agar	15.0	g
Distilled water	1000.0	ml

B.5 Trace Salts Solution

$FeS0_4.7H_20$	0.1	g
$MnCl_2.4H_20$	0.1	g
$ZnS0_4.7H_20$	0.1	g
Distilled Water	100. 0	ml

B.6 Tryptone-Yeast Extract Broth (ISP - 2) (Pridham and Gottlieb, 1948)

Bacto-Tryptone (Difco)	5.0	g
Bacto-Yeast Extract (Difco)	3.0	g
Distilled water	1.0	l
pH 7.0-7.2		

B.7 Oatmeal Agar Medium (ISP 3) (KUlster, 1959)

Oatmeal	60	g
Agar	12.5	g
Distilled water	1000	ml

B.8 Inorganic Salts-Starch Agar Medium (ISP 4) (Kuster, 1959)

Difco soluble starch	10. 0	g
K_2HP0_4 (anhydrous basis)	1.0	g
$MgS0_4.7H_2O$	1.0	g
NaCl	1.0	g
$(NH_4)_2S0_4$	2.0	g
$CaC0_3$	2.0	g
Distilled water	1.0	L
Trace salts solution	1.0	ml
Agar (Difco)	20.0	g
pH 7.0-7.4		

B.9 Glycerol-Asparagine Agar Medium (ISP 5) (Pridham and Lyons, 1961)

L-asparagine	1.0	g
Glycerol	10.0	g
K_2HP0_4	1.0	g
Distilled water	1.0	l
Trace salts solution	1.0	ml
Agar (Difco)	20.0	g
pH 7. 0-7. 4		

B.10 Pridham and Gottlieb trace salts (Pridham and Gottlieb, 1948)

$CuS0_4.5H_20$	0.64	g
$FeS0_4.7H_20$	0.11	g
$MnCl_2.4H_20$	0.79	g
$ZnS0_4.7H_20$	0.15	g
Distilled water	100.0	ml

B.11 Basal mineral salts agar (Pridham and Gottlieb, 1948)

$(NH_4)S0_4$	2.64	g
KH_2P0_4	2.38	g
$K_2HPO_4.3H_2O$	5.65	g
$MgS0_4.7H_20$	1.00	g
Trace salts	1.0	ml
Distilled water	1.0	l
Add agar	15.0	g

pH 6.8-7.0

B.12 Carbon utilization medium (Pridham and Gottlieb, 1948)

1. Sterile carbon sources

Use chemically pure carbon sources certified to be free of admixture with other carbohydrates or contaminating materials.

Carbon sources:
- No carbon source (negative control)
- D-glucose (positive control)
- L-arabinose
- Sucrose
- D-fructose
- D-xylose
- Rhamnose
- I-inositol
- Raffinose
- D-mannitol
- Cellulose

2. Sterilize without heat by one of the following methods: Ether sterilization.

Weigh an appropriate amount of the dry carbon source and spread as a shallow layer in a pre-sterilized Erlenmeyer flask fitted with a loose cotton plug. Add sufficient acetone-free ethyl ether $(C_2H_5)_{20}$ to cover the carbohydrate.

Allow ether to evaporate at room temperature under a ventilated fume hood overnight or longer. When all ether has evaporated add sterile distilled water aseptically to make a 10% w/v solution of the carbon source.

3. Complete medium

Sterilize basal agar medium; cool it to 60'C and add sterile carbon source aseptically to give a concentration of approximately 1%. Agitate the mixture and pour 25ml of medium per dish into 9 cm Petri dishes. Each organism will require 2 Petri dishes with no carbon (as a negative control) plus duplicate plates for each carbon source tested.

B.13 Basal medium for Nitrogen source utilization

D-Glucose	1.0	g
$MgSO_4.7H_2O$	0.05	g
NaCl	0.05	g
$FeSO_4.7H_2O$	0.001	g
K_2HPO_4	0.1	g
Agar	2.0	g
Distilled water	100	ml
Nitrogen source	0.1%	w/v

pH 7.0±2

B.14 Luria agar (LA)

Ingredients	**Concentration**	
Tryptone	10.0	g
Yeast extract	5.0	g
Sodium chloride	5.0	g
Agar	18.0	g

PH 7.2

APPENDIX C

REAGENTS AND BUFFER

C.1 Loading Dye

6x loading dye

Bromophenol blue	0.25	g
Sucrose in water	40.0	g (w/v)
Distilled water	100.0	ml

C.2 Ethidium Bromide

Ethidium bromide	10.0	mg
Distilled water	1.0	ml

Stored in dark bottle

C.3 Agarose Gel

1% Agarose Gel (40 ml)

Agarose	400.0	mg
1x TAE	40.0	ml

C.4 TAE Buffer

50x TAE Buffer

Tris base	242.0	g
Glacial acetic acid	57.1	ml
0.5 M EDTA (pH 8.0)	100	ml

Total volume 1000 ml with double distilled water.

C.5 1M Tris, pH 8.0

Tris	121.1	g
Water	1.0	l

pH 8.0

C.6 0.5 M EDTA, pH 8

EDTA	18.6	g
Water	100	ml
pH 8.0		

C.7 TE-Tris, pH 8

10X T-Tris

1 M Tris, pH 8.0	5	ml
0.5 M EDTA	1	ml
H_20	44	ml

C.8 Colloidal Chitin (Berger and Reynolds, 1988)

1. Add 10g of chitin into 400 ml of concentrated HC1 and stirrer until completely dissolving.
2. Add distilled water and left overnight at 4°C.
3. Filtrate colloidal chitin and wash through the water to attain neutral pH.
4. Dissolve in distilled water prior to use.

C.9 Phosphate buffer

Prepare stock solutions.

2 M solution of monobasic sodium phosphate

$NaH_2PO_4.H_2O$	27.8	g
Distilled water	1000	ml

0.2 M solution of diabasic sodium phosphate

$Na_2HPO_4.7H_2O$	52.65	g
Distilled water	1000	ml

C.10 Preparation of Di-Nitrosalycyclic Acid (DNS) solution (Miller, 1959).

Distilled water	1416	ml
3-5 Dinitrosalycyclic Acid	10.6	g
NaOH	19.5	g

The above ingredients were dissolved gently in water bath at 80°C until a clear solution was obtained. Then the following chemicals were added.

Sodium potassium tartrate	300	g
Phenol (melted at 60°C)	7.5	ml
Sodium meta bisulphate	8.3	g

After dissolving the above ingredients, the solution was filtered through a large coarse sintered glass filter and stored at room temperature in an amber colored bottle to avoid photo oxidation.

C.11 Preparation of para-Di-Methyl Amino Benzaldehyde (DMAB)

1. Add 6.1 g of dipotassium tetraborate tetrahydrate in 100 ml of distilled water.
2. Add 1.5 ml of distilled water to 11.0 ml of concentrated HC1 and made up to 100 ml with glacial acetic acid.
3. Add 10.0 g of DMAB in glacial acetic acid/HCl solution (10 ml of this solution was diluted to 100 ml with glacial acetic acid just before use.).

APPENDIX D

EXPERIMENT ANALYSIS

D.1 Reducing SugarAnalysis (DMAB Method)

1. Add 1.0 ml of 1.0% colloidal chitin in 50 mM phosphate buffer (pH 7.0) to test tube.
2. Add 1.0 ml sample and completely mix with vortex.
3. Incubate 50°C, 60 min.
4. Add 0.2 ml of boric acid solution and incubate exactly 3 minutes in boiling water.
5. Rapid cool in an ice-water bath and add 6.0 ml DMAB reagent.
6. Incubate 37°C, 20 min and immediately measure by spectrophotometer (Hitachi U-2010) at 544nm.
7. The boiled sample use as control sample and distilled water use as enzyme blank.

*One unit of enzyme activity equals to1 µM of reducing sugar released per minutes.

D.2 Reducing SugarAnalysis (DNS method).

1. Add 1.0 ml of 0.5% carboxyl methyl cellulose (CMC) in 50mM phosphate buffer (pH 7.0) to test tube.
2. Add 1.0 ml sample and completely mix with vortex.
3. Incubate 50°C, 60 min.
4. Add 3.0 ml of DNS reagent and develop color by boiling 5 min.
5. Rapid cool down at room temperature and add 6.0 ml DMAB reagent.
6. Incubate 37°C, 20 min and measure absorbance by spectrophotometer (Hitachi U-2010) at 540 nm.
7. The boiled sample use as control sample and distilled water use as enzyme blank.

*One unit (U) of enzyme activity was defined as the amount of enzyme which liberates 1µmol of glucose per min under the above assay conditions (Miller, 1959).

D.3 NAG Standard Curve

Construct a linear glucose standard curve using the absolute amounts of NAG (µg/ml) plotted against A_{540}.

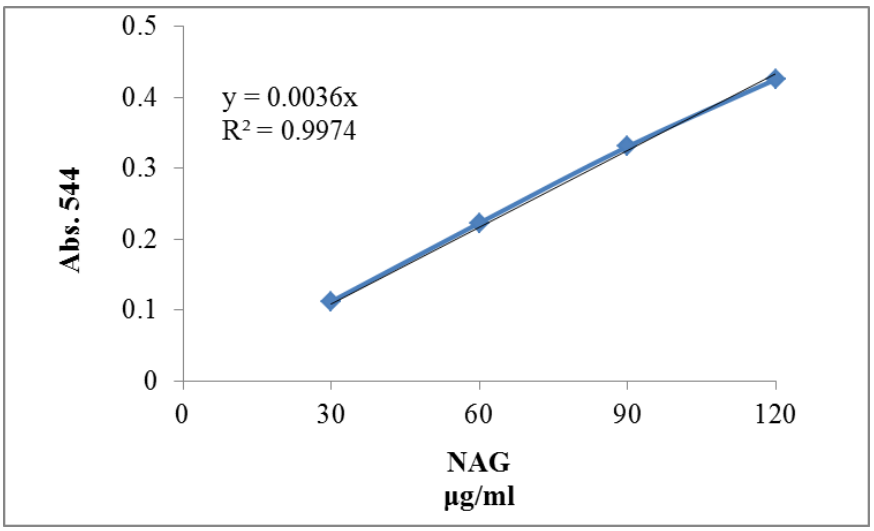

Figure D.1 Standard curve of reducing sugar by DMAB method using NAG as standard sugar

D.4 Glucose Standard Curve

Construct a linear glucose standard curve using the absolute amounts of glucose (mg/ml) plotted against A_{540}.

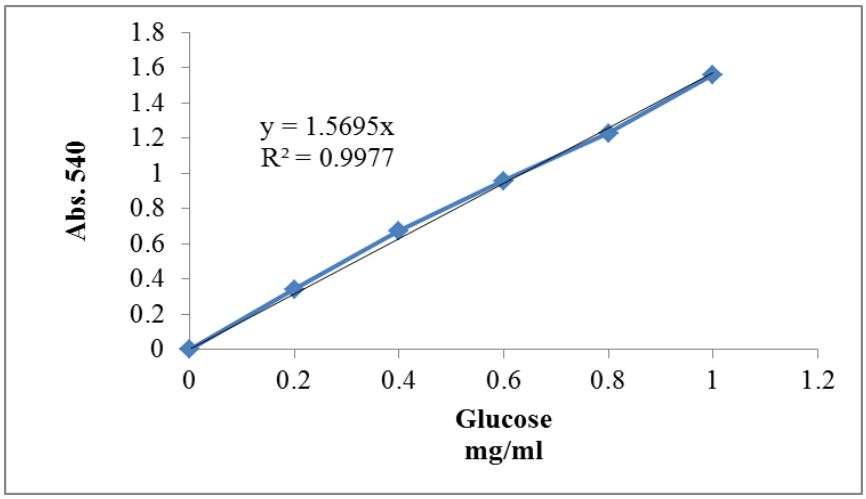

Figure D.2 Standard curve of reducing sugar by DNS method using glucose as standard sugar

APPENDIX E

MOLECULAR ANALYSIS

E.1 Method for DNA Extraction

1. Centrifuge cell at 13,000 rpm for a minute.
2. Discard the medium and wash the pellet twice times with 1ml sterile distilled water.
3. Re-suspend the pellet in 200µl Solution I (50mM Tris pH 8.0 with HCl, 10mM EDTA).
4. Add 4 µl of lysozyme (1 mg/ml) and a few grams of acromopeptidase.
5. Incubate 37 ºC, 30 min.
6. Add 20 µl, 10% SDS and 200 µl, 1x TE (pH 8) to make a final volume, 420 µl.
7. Add equal volume of phenol: chloroform (1:1) and and centrifuge at 13000 rpm for 15 min.
8. Transfer the upper aqueous phase into a new eppendorf tube.
9. Add double volumes of cold 99.5% EtOH and 40 µl, Solution III (3.0M Potassium Acetate, pH5.5) and incubate -80 ºC, for 20 min.
10. Centrifuge at 13000 rpm for 10 min at 4 ºC
11. Discard the supernatant and wash the pellet with 700 µl 70% EtOH.
12. Dry the pellet with vacuum pump.
13. Dissolve the pellet in 200 µl, 1xTE buffer (pH 8.0) and add 5 µl RNase solutions.
14. Incubate 37°C, for 30 min.
15. Replete the step 7-12 and dissolve the pellet in 10µl of sterilized distilled water (SDW).

E.2 PCR Amplification Method

1. Use the forward primer as 27f (5'GAGTTTGATCCTGGCTCAG-3') and reverse primer as 1525r (5'-AAGGAGGTGATCCAGCC-3') (Brosius et al., 1978).
2. Prepare the reaction mixture containing1 µl template DNA (50-200ng), 0.5 µl each primer (10pmol/µl), 6.25 µl Go-Taq DNA polymerase mixture (Promega), and 4.25 µl sterile distilled water.
3. Set the PCR machine at an initial denaturation at 96°C for 4 min; 30 cycles of denaturation at 96°C for 30 s, annealing at 50°C for 30 s, extension at 72°C for 2 min; and a final extension at 72°C for 10 min.

E.3 Wizard®SV Gel and PCR Clean-Up System (Promega)

1. Cut the DNA fragment using a clean scalpel or razor blade. Transfer the gel slice to the weighed microcentrifuge tube and record the weight.
2. Add Membrane Binding Solution at a ratio of 10µl of solution per 10mg of agarose gel slice.
3. Vortex the mixture and incubate at 50–65°C for 10 min or until the gel slice is completely dissolved.
4. Centrifuge the tube briefly at room temperature to ensure the contents are at the bottom of the tube.
5. Place one SV minicolumn in a Collection Tube for each dissolved gel slice or PCR amplification.
6. Transfer the dissolved gel mixture or prepared PCR product to the SV minicolumn assembly and incubate for 1 min at room temperature.
7. Centrifuge the SV minicolumn assembly in a microcentrifuge at 14,000rpm for 1 minute.
8. Remove the SV minicolumn from the Spin Column assembly and discard the liquid in the Collection Tube. Return the SV minicolumn to the Collection Tube.
9. Wash the column by adding 700µl of Membrane Wash Solution, previously diluted with 95% ethanol, to the SV minicolumn.
10. Centrifuge the SV Minicolumn assembly for 1 min at 14,000rpm.

11. Empty the Collection Tube as before and place the SV minicolumn back in the Collection Tube. Repeat the wash with 500 µl of Membrane Wash Solution and centrifuge the SV minicolumn assembly for 5 min at 14,000 rpm.
12. Remove the SV minicolumn assembly from the centrifuge, being careful not to wet the bottom of the column with the flow through. Empty the Collection Tube and re-centrifuge the column assembly for 1 min with the microcentrifuge lid open (or off) to allow evaporation of any residual ethanol.
13. Carefully transfer the SV minicolumn to a clean 1.5ml microcentrifuge tube.
14. Apply 50µl of Nuclease-Free Water directly to the center of the column without touching the membrane with the pipette tip.
15. Incubate at room temperature for 1 minute. Centrifuge for 1 minute at 14,000rpm.
16. Discard the SV mini-column and store the microcentrifuge tube containing the eluted DNA at 4°C or –20°C.

E.4 Gel Electrophoresis

1. Add agarose in 1X TAE buffer (0.04 M Tris-HCl, 0.04 M acetic acid, 0.001 M EDTA (pH 8.0)) and melt to make agarose gel.
2. Mix the samples with 6X loading dye (0.25% bromophenol blue, 0.25% xylene cyanol FF and 30% glycerol) at ratio 5:1.
3. Load sample and marker into agarose gel under 1X TAE buffer.
4. Set the electrophoresis at 100 V for 60 min.
5. Stain gel with ethidium bromide solution (0.1 mg/ml EtBr) for 10 min and de-stain with distilled water for 10 min.
6. Visual gel under UV light transillumination.

E.5 Sequencing Method

1. Use the primer 27f (5'-GAGTTTGATCCTGGCTCAG-3'), primer 357f (5'CTCCTACGGGAGGCAGCAG-3'), primer 937r (5'-TTGGTGCTGTATGCTGTAACTG-3') and primer 1525r (5'-AAGGAGGTGATCCAGCC-3') (Rintala et al., 2001).
2. Add 1.0 µl sample, 1.0 µl primer (1.6pmol/µl), 1.5µl 5x Sequence buffer, 1.0µl premix, and 5.5 µl sterile distilled water in to PCR tube.
3. Set the PCR machine at an initial denaturation at 96°C for 1 min; 25 cycles of denaturation at 96°C for 10 s, annealing at 50°C for 5 s, extension at 60°C for 4 min.
4. Add 1.0µl 125mM EDTA, 1.0µl 3M Sodium Acetate, and 25µl 99.5%EtOH and place at room temperature in dark area for 15mins.
5. Centrifuge at 8000rpm for 15min at room temperature and discard the solution.
6. Add 35µl 70% EtOH and centrifuge at 12,000rpm for 10min at room temperature.
7. Discard the solution and dry in vacuum chamber.
8. Add 25µl HDF and completely mix.
9. Analysis in ABI PRISM 310 sequencer (Applied Biosystems, USA) by using the BigDye Terminator v3.1 Cycle Sequencing Kit (Applied Biosystems).

E.6 DNA-DNA hybridization Method (Ezaki et al., 1988).

1. Extract the chromosome DNA of *Streptomyces* sp. strain S4, reference strains; *S. fradiae* NBRC3360, *S. rubrolavendulae* NBRC13683 and *Escherichia coli*.
2. Denature and spot 5, 10, 15, and 25µg of the chromosome DNA on a Biodyne® Nylon Transfer Membrane
3. Bake the membrane at 80°C for 2 h.
4. Pre-hybridize at 72°C for 30 min with specific probe [(DIG)-High Prime DNA labeling kit (Boehringer)]
5. Hybridize with probe [(DIG)-High Prime DNA labeling kit (Boehringer)] at 72°C for overnight with gentle agitation specific.

6. Wash with 10 ml of 2xSSC, 0.1% SDS 10min at room temperature two times.
7. Add 100 ml blocking solution and incubate for 30 min with gentle agitation at room temperature.
8. Add 20 ml antibody solution and incubate for 30 min with gentle agitation at room temperature.
9. Add 100 ml washing buffer and wash two times for 20 min with gentle agitation at room temperature.
10. Add 20 ml detection buffer to equilibrate for 2-5 min.
11. Add color substrate solution and keep in the dark area during color development.
12. Scan and calculate %DDH by using NIH image software.

APPENDIX F

NUCLEOTIDE DATABASE

1. ORGANISM: *Streptomyces rubrolavendulae* NBRC 13683

```
   1 gacgaacgct ggcggcgtgc ttaacacatg caagtcgaac gatgaaccca cttcggtggg
  61 ggattagtgg cgaacgggtg agtaacacgt gggcaatctg ccctgcactc tgggacaagc
 121 cctggaaacg gggtctaata ccggatacga ccacttcagg catctgatgg tggtggaaag
 181 ctccggcggt gcaggatgag cccgcggcct atcagctagt tggtgaggta acggctcacc
 241 aaggcgacga cgggtagccg gcctgagagg gcgaccggcc acactgggac tgagacacgg
 301 cccagactcc tacgggaggc agcagtgggg aatattgcac aatgggcgaa agcctgatgc
 361 agcgacgccg cgtgagggat gacggccttc gggttgtaaa cctctttcag cagggaagaa
 421 gcgaaagtga cggtacctgc agaagaagcg ccggctaact acgtgccagc agccgcggta
 481 atacgtaggg cgcaagcgtt gtccggaatt attgggcgta aagagctcgt aggcggcctg
 541 tcacgtcgga tgtgaaagcc cggggcttaa ccccgggtct gcattcgata cgggcaggct
 601 agagttcggt aggggagatc ggaattcctg gtgtagcggt gaaatgcgca gatatcagga
 661 ggaacaccgg tggcgaaggc ggatctctgg gccgatactg acgctgagga gcgaaagcgt
 721 ggggagcgaa caggattaga taccctggta gtccacgccg taaacgttgg gaactaggtg
 781 tgggcgacat tccacgtcgt ccgtgccgca gctaacgcat taagttcccc gcctggggag
 841 tacggccgca aggctaaaac tcaaaggaat tgacgggggc ccgcacaagc ggcggagcat
 901 gtggcttaat tcgacgcaac gcgaagaacc ttaccaaggc ttgacataca ccggaaacac
 961 ccagagatgg gtgccccctt gtggtcggtg tacaggtggt gcatggctgt cgtcagctcg
1021 tgtcgtgaga tgttgggtta agtcccgcaa cgagcgcaac ccttgtcccg tgttgccagc
1081 aggcccttgt ggtgctgggg actcacggga gaccgccggg gtcaactcgg aggaaggtgg
1141 ggacgacgtc aagtcatcat gccccttatg tcttgggctg cacacgtgct acaatggccg
1201 gtacaaagag ctgcgatacc gcaaggtgga gcgaatctca aaaagccggt ctcagttcgg
1261 attggggtct gcaactcgac cccatgaagt cggagtcgct agtaatcgca gatcagcatt
1321 gctgcggtga atacgttccc gggccttgta cacaccgccc gtcacgtcac gaaagtcggt
1381 aacacccgaa gccggtggcc caaccccttg tgggagggag ctgtcgaagg tgggactggc
1441 gattgggacg aagtcgtaac aaggtagccg taccggaagg tgc
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2. ORGANISM: *Streptomyces fradiae* NBRC 3439

```
   1 ctggcggcgt gcttaacaca tgcaagtcga acgatgaacc cacttcggtg ggggattagt
  61 ggcgaacggg tgagtaacac gtgggcaatc tgccctgcac tctgggacaa gccctggaaa
 121 cggggtctaa taccggatac gaccacttca ggcatctgat ggtggtggaa agctccggcg
 181 gtgcaggatg agcccgcggc ctatcagcta gttggtgagg taacggctca ccaaggcgac
 241 gacgggtagc cggcctgaga gggcgaccgg ccacactggg actgagacac ggcccagact
 301 cctacgggag gcagcagtgg ggaatattgc acaatgggcg aaagcctgat gcagcgacgc
 361 cgcgtgaggg atgacggcct tcgggttgta aacctctttc agcagggaag aagcgaaagt
 421 gacggtacct gcagaagaag cgccggctaa ctacgtgcca gcagccgcgg taatacgtag
 481 ggcgcaagcg ttgtccggaa ttattgggcg taaagagctc gtaggcggcc tgtcacgtcg
 541 gatgtgaaag cccggggctt aaccccgggt ctgcattcga tacgggcagg ctagagttcg
 601 gtaggggaga tcggaattcc tggtgtagcg gtgaaatgcg cagatatcag gaggaacacc
 661 ggtggcgaag gcggatctct gggccgatac tgacgctgag gagcgaaagc gtggggagcg
 721 aacaggatta gataccctgg tagtccacgc cgtaaacgtt gggaactagg tgtgggcgac
 781 attccacgtc gtccgtgccg cagctaacgc attaagttcc ccgcctgggg agtacggccg
 841 caaggctaaa actcaaagga attgacgggg gcccgcacaa gcggcggagc atgtggctta
 901 attcgacgca acgcgaagaa ccttaccaag gcttgacata caccggaaac acccagagat
 961 gggtgccccc ttgtggtcgg tgtacaggtg gtgcatggct gtcgtcagct cgtgtcgtga
```

```
1021 gatgttgggt taagtcccgc aacgagcgca acccttgtcc cgtgttgcca gcaggccctt
1081 gtggtgctgg ggactcacgg gagaccgccg gggtcaactc ggaggaaggt ggggacgacg
1141 tcaagtcatc atgcccctta tgtcttgggc tgcacacgtg ctacaatggc cggtacaaag
1201 agctgcgata ccgcaaggtg gagcgaatct caaaaagccg gtctcagttc ggattggggt
1261 ctgcaactcg accccatgaa gtcggagtcg ctagtaatcg cagatcagca ttgctgcggt
1321 gaatacgttc ccgggccttg tacacaccgc ccgtcacgtc acgaaagtcg gtaacacccg
1381 aagccggtgg cccaacccct tgtgggaggg agctgtcgaa ggtgggactg gcgattggga
1441 cgaagtcgta acaaggtagc cgtaccg
```

3. ORGANISM: *Streptomyces nogalater*

```
   1 cgaacgctgg cggcgtgctt aacacatgca agtcgaacga tgaacctcct tcgggagggg
  61 attagtggcg aacgggtgag taacacgtgg gcaatctgcc ctgcactctg ggacaagccc
 121 tggaaacggg gtctaatacc ggatacgagc ctccaccgca tggtgggggt tggaaagctc
 181 cggcggtgca ggatgagccc gcggcctatc agcttgttgg tgaggtaacg gctcaccaag
 241 gcgacgacgg gtagccggcc tgagagggcg accggccaca ctgggactga gacacggccc
 301 agactcctac gggaggcagc agtggggaat attgcacaat gggcgaaagc ctgatgcagc
 361 gacgccgcgt gagggatgac ggccttcggg ttgtaaacct ctttcagcag ggaagaagcg
 421 aaagtgacgg tacctgcaga agaagcgccg gctaactacg tgccagcagc cgcggtaata
 481 cgtagggcgc aagcgttgtc cggaattatt gggcgtaaag agctcgtagg cggcttgtca
 541 cgtcggttgt gaaagcccgg ggcttaaccc cgggtctgca gtcgatacgg gcaggctaga
 601 gttcggtagg ggagatcgga attcctggtg tagcggtgaa atgcgcagat atcaggagga
 661 acaccggtgg cgaaggcgga tctctgggcc gatactgacg ctgaggagcg aaagcgtggg
 721 gagcgaacag gattagatac cctggtagtc cacgccgtaa acggtgggca ctaggtgtgg
 781 gcaacattcc acgttgtccg tgccgcagct aacgcattaa gtgccccgcc tggggagtac
 841 ggccgcaagg ctaaaactca aaggaattga cgggggcccg cacaagcggc ggagcatgtg
 901 gcttaattcg acgcaacgcg aagaacctta ccaaggcttg acatacaccg gaaagcatta
 961 gagatagtgc ccccttgtg gtcggtgtac aggtggtgca tggctgtcgt cagctcgtgt
1021 cgtgagatgt tgggttaagt cccgcaacga gcgcaaccct tgtcccgtgt tgccagcagg
1081 cccttgtggt gctggggact cacgggagac cgccggggtc aactcggagg aaggtgggga
1141 cgacgtcaag tcatcatgcc ccttatgtct tgggctgcac acgtgctaca atggccggta
1201 caaagagctg cgataccgtg aggtggagcg aatctcaaaa agccggtctc agttcggatt
1261 ggggtctgca actcgacccc atgaagtcgg agtcgctagt aatcgcagat cagcattgct
1321 gcggtgaata cgttcccggg ccttgtacac accgcccgtc acgtcacgaa agtcggtaac
1381 acccgaagcc ggtggcccaa ccccttgtgg gagggagctg tcgaaggtgg gactggcgat
1441 tgggacgaag tcgtaacaag gtagccgtac cggaagg
```

4. ORGANISM: *Streptomyces eurythermus*

```
   1 cattcacgga gagtttgatc ctggctcagg acgaacgctg gcggcgtgct taacacatgc
  61 aagtcgaacg atgaacctcc ttcgggaggg gattagtggc gaacgggtga gtaacacgtg
 121 ggcaatctgc ccttcactct gggacaagcc ctggaaacgg ggtctaatac cggatacgag
 181 cctccaaggc atcttggagg ttggaaagct ccggcggtga aggatgagcc cgcggcctat
 241 cagcttgttg gtgaggtaat ggctcaccaa ggcgacgacg ggtagccggc ctgagagggc
 301 gaccggccac actgggactg agacacggcc cagactccta cgggaggcag cagtggggaa
 361 tattgcacaa tgggcgaaag cctgatgcag cgacgccgcg tgagggatga cggccttcgg
 421 gttgtaaacc tctttcagca gggaagaagc gaaagtgacg gtacctgcag aagaagcgcc
 481 ggctaactac gtgccagcag ccgcggtaat acgtagggcg caagcgttgt ccggaattat
 541 tgggcgtaaa gagctcgtag gcggcttgtc acgtcggttg tgaaagcccg gggcttaacc
 601 ccgggtctgc agtcgatacg ggcaggctag agttcggtag gggagatcgg aattcctggt
 661 gtagcggtga aatgcgcaga tatcaggagg aacaccggtg gcgaaggcgg atctctgggc
 721 cgatactgac gctgaggagc gaaagcgtgg ggagcgaaca ggattagata ccctggtagt
 781 ccacgccgta aacggtgggc actaggtgtg ggcaacattc cacgttgtcc gtgccgcagc
```

```
 841 taacgcatta agtgccccgc ctggggagta cggccgcaag gctaaaactc aaaggaattg
 901 acgggggccc gcacaagcgg cggagcatgt ggcttaattc gacgcaacgc gaagaacctt
 961 accaaggctt gacatacacc ggaaagcatt agagatagtg ccccccttgt ggtcggtgta
1021 caggtggtgc atggctgtcg tcagctcgtg tcgtgagatg ttgggttaag tcccgcaacg
1081 agcgcaaccc ttgtcccgtg ttgccagcag gcccttgtgg tgctggggac tcacgggaga
1141 ccgccggggt caactcggag gaaggtgggg acgacgtcaa gtcatcatgc cccttatgtc
1201 ttgggctgca cacgtgctac aatggccggt acaatgagct gcgataccgt gaggtggagc
1261 gaatctcaaa aagccggtct cagttcggat tggggtctgc aactcgaccc catgaagtcg
1321 gagttgctag taatcgcaga tcagcattgc tgcggtgaat acgttcccgg gccttgtaca
1381 caccgcccgt cacgtcacga aagtcggtaa cacccgaagc cggtggccca acccccttgtg
1441 ggagggagct gtcgaaggtg ggactggcga ttgggacgaa gtcgtaacaa ggtagccgta
1501 ccggaaggtg cggctggatc acctcctttc t
```

5. ORGANISM: *Streptomyces paradoxus*

```
   1 caagtcgaac gatgaaccac ttcggtgggg attagtggcg aacgggtgag taacacgtgg
  61 gcaatctgcc ctgcactctg ggacaagccc tggaaacggg gtctaatacc ggatactgat
 121 catcttgggc atccaaggtg ttcgaaagct ccggcggtgc aggatgagcc cgcggcctat
 181 cagcttgttg gtgaggtagt ggctcaccaa ggcgacgacg ggtagccggc ctgagagggc
 241 gaccggccac actgggactg agacacggcc cagactccta cgggaggcag cagtggggaa
 301 tattgcacaa tgggcgaaag cctgatgcag cgacgccgcg tgagggatga cggccttcgg
 361 gttgtaaacc tctttcagca gggaagaagc gaaagtgacg gtacctgcag aagaagcgcc
 421 ggctaactac gtgccagcag ccgcggtaat acgtagggcg cgagcgttgt ccggaattat
 481 tgggcgtaaa gagctcgtag gcggcttgtc acgtcggttg tgaaagcccg gggcttaacc
 541 ccgggtctgc agtcgatacg ggcaggctag agttcggtag gggagatcgg aattcctggt
 601 gtagcggtga aatgcgcaga tatcaggagg aacaccggtg gcgaaggcgg atctctgggc
 661 cgatactgac gctgaggagc gaaagcgtgg ggagcgaaca ggattagata ccctggtagt
 721 ccacgccgta aacggtgggc actaggtgtg ggcaacattc cacgttgtcc gtgccgcagc
 781 taacgcatta agtgccccgc ctggggagta cggccgcaag gctaaaactc aaaggaattg
 841 acgggggccc gcacaagcgg cggagcatgt ggcttaattc gacgcaacgc gaagaacctt
 901 accaaggctt gacatacacc ggaaagcatt agagatagtg ccccccttgt ggtcggtgta
 961 caggtggtgc atggctgtcg tcagctcgtg tcgtgagatg ttgggttaag tcccgcaacg
1021 agcgcaaccc ttgtcccgtg ttgccagcag gcccttgtgg tgctggggac tcacgggaga
1081 ccgccggggt caactcggag gaaggtgggg acgacgtcaa gtcatcatgc cccttatgtc
1141 ttgggctgca cacgtgctac aatggccggt acaatgagct gcgataccgc gaggtggagc
1201 gaatctcaaa aagccggtct cagttcggat tggggtctgc aactcgaccc catgaagtcg
1261 gagtcgctag taatcgcaga tcagcattgc tgcggtgaat acgttcccgg gccttgtaca
1321 caccgcccgt cacgtcacga aagtcggtaa cacccgaagc cggtggccca acccccttgtg
1381 ggagggagct gtcgaaggtg ggactggcga ttgggacgaa gtcgtaacaa ggtagccgta
1441 ccggaagg
```

5. ORGANISM: *Streptomyces intermedius*

```
   1 aacgctggcg gcgtgcttaa cacatgcaag tcgaacgatg aagcccttcg gggtggatta
  61 gtggcgaacg ggtgagtaac acgtgggcaa tctgccctgc actctgggac aagccctgga
 121 aacggggtct aataccggat atgactgtcc accgcatggt ggatggtgta aagctccggc
 181 ggtgcaggat gagcccgcgg cctatcagct agttggtgag gtagtggctc accaaggcga
 241 cgacgggtag ccggcctgag agggcgaccg gccacactgg gactgagaca cggcccagac
 301 tcctacggga ggcagcagtg gggaatattg cacaatgggc gaaagcctga tgcagcgacg
 361 ccgcgtgagg gatgacggcc ttcgggttgt aaacctcttt cagcagggaa gaagcgaaag
 421 tgacggtacc tgcagaagaa gcgccggcta actacgtgcc agcagccgcg gtaatacgta
 481 gggcgcaagc gttgtccgga attattgggc gtaaagagct cgtaggcggc ttgtcacgtc
 541 ggttgtgaaa gcccggggct taaccccggg tctgcagtcg atacgggcag gctagagttc
 601 ggtaggggag atcggaattc ctggtgtagc ggtgaaatgc gcagatatca ggaggaacac
 661 cggtggcgaa ggcggatctc tgggccgata ctgacgctga ggagcgaaag cgtggggagc
```

```
 721 gaacaggatt agataccctg gtagtccacg ccgtaaacgg tgggcactag gtgtgggcaa
 781 cattccacgt tgtccgtgcc gcagctaacg cattaagtgc cccgcctggg gagtacggcc
 841 gcaaggctaa aactcaaagg aattgacggg ggcccgcaca agcggcggag catgtggctt
 901 aattcgacgc aacgcgaaga accttaccaa ggcttgacat acaccggaaa gcatcagaga
 961 tagtgccccc cttgtggtcg gtgtacaggt ggtgcatggc tgtcgtcagc tcgtgtcgtg
1021 agatgttggg ttaagtcccg caacgagcgc aacccttgtc ccgtgttgcc agcaggccct
1081 tgtggtgctg gggactcacg ggagaccgcc ggggtcaact cggaggaagg tggggacgac
1141 gtcaagtcat catgcccctt atgtcttggg ctgcacacgt gctacaatgg ccggtacaat
1201 gagctgcgat accgcgaggt ggagcgaatc tcaaaaagcc ggtctcagtt cggattgggg
1261 tctgcaactc gaccccatga agtcggagtc gctagtaatc gcagatcagc attgctgcgg
1321 tgaatacgtt cccgggcctt gtacacaccg cccgtcacgt cacgaaagtc ggtaacaccc
1381 gaagccggtg gcccaacccc ttgtgggagg gagctgtcga aggtgggact ggcgattggg
1441 acgaagtcgt aacaaggtag ccgtaccgga aggt
```

6. ORGANISM: *Streptomyces gougerotii*

```
   1 aacgctggcg gcgtgcttaa cacatgcaag tcgaacgatg aagcccttcg gggtggatta
  61 gtggcgaacg ggtgagtaac acgtgggcaa tctgccctgc actctgggac aagccctgga
 121 aacggggtct aataccggat atgaccgtcc atcgcatggt ggatggtgta aagctccggc
 181 ggtgcaggat gagcccgcgg cctatcagct agttggtgag gtagtggctc accaaggcga
 241 cgacgggtag ccggcctgag agggcgaccg gccacactgg gactgagaca cggcccagac
 301 tcctacggga ggcagcagtg gggaatattg cacaatgggc gaaagcctga tgcagcgacg
 361 ccgcgtgagg gatgacggcc ttcgggttgt aaacctcttt cagcagggaa gaagcgaaag
 421 tgacggtacc tgcagaagaa gcgccggcta actacgtgcc agcagccgcg gtaatacgta
 481 gggcgcaagc gttgtccgga attattgggc gtaaagagct cgtaggcggc ttgtcacgtc
 541 ggttgtgaaa gccccggggct taaccccggg tctgcagtcg atacgggcag gctagagttc
 601 ggtaggggag atcggaattc ctggtgtagc ggtgaaatgc gcagatatca ggaggaacac
 661 cggtggcgaa ggcggatctc tgggccgata ctgacgctga ggagcgaaag cgtggggagc
 721 gaacaggatt agataccctg gtagtccacg ccgtaaacgg tgggcactag gtgtgggcaa
 781 cattccacgt tgtccgtgcc gcagctaacg cattaagtgc cccgcctggg gagtacggcc
 841 gcaaggctaa aactcaaagg aattgacggg ggcccgcaca agcggcggag catgtggctt
 901 aattcgacgc aacgcgaaga accttaccaa ggcttgacat acaccggaaa gcatcagaga
 961 tggtgccccc cttgtggtcg gtgtacaggt ggtgcatggc tgtcgtcagc tcgtgtcgtg
1021 agatgttggg ttaagtcccg caacgagcgc aacccttgtc ccgtgttgcc agcaggccct
1081 tgtggtgctg gggactcacg ggagaccgcc ggggtcaact cggaggaagg tggggacgac
1141 gtcaagtcat catgcccctt atgtcttggg ctgcacacgt gctacaatgg ccggtacaat
1201 gagctgcgat accgcgaggt ggagcgaatc tcaaaaagcc ggtctcagtt cggattgggg
1261 tctgcaactc gaccccatga agtcggagtc gctagtaatc gcagatcagc attgctgcgg
1321 tgaatacgtt cccgggcctt gtacacaccg cccgtcacgt cacgaaagtc ggtaacaccc
1381 gaagccggtg gcccaacccc cttgtgggga gggagctgtc gaaggtggga ctggcgattg
1441 ggacgaagtc gtaacaaggt agccgtaccg gaaggt
```

7. ORGANISM: *Streptomyces jietaisiensis*

```
   1 cggcgtgctt aacacatgca agtcgaacga tgaaccagct tcggtgggga tttgtggcga
  61 acgggtgagt aacacgtggg caatctgccc tgcactctgg gacaagccct ggaaacgggg
 121 tctaataccg gatacaacca ctgaccgcat ggtcgggtgg tggaaagctc cggcggtgca
 181 ggatgagccc gcggcctatc agcttgttgg tgaggtagtg gctcaccaag gcgacgacgg
 241 gtagccggcc tgagagggcg accggccaca ctgggactga gacacggccc agactcctac
 301 gggaggcagc agtggggaat attgcacaat gggcgaaagc ctgatgcagc gacgccgcgt
 361 gagggatgac ggccttcggg ttgtaaacct ctttcagcag ggaagaagcg aaagtgacgg
 421 tacctgcaga agaagcgccg gctaactacg tgccagcagc cgcggtaata cgtagggcgc
 481 caagcgttgt cggaattatt gggcgtaaag agctcgtaga cggcttgtca cgtcggttgt
 541 gaaagcccgg ggcttaaccc cgggtctgca gtcgatacgg gcaggctaga gttcggtagg
 601 ggagatcgga attcctggtg tagcggtgaa atgcgcagat atcaggagga acaccggtgg
```

```
 661 cgaaggcgga tctctgggcc gatactgacg ctgaggagcg aaagcgtggg gagcgaacag
 721 gattagatac cctggtagtc cacgccgtaa acggtgggca ctaggtgtgg gcaacattcc
 781 acgttgtccg tgccgcagct aacgcattaa gtgccccgcc tggggagtac ggccgcaagg
 841 ctaaaactca aaggaattga cgggggcccg cacaagcggc ggagcatgtg gcttaattcg
 901 acgcaacgcg aagaaccttа ccaaggcttg acatacaccg gaaagcatta gagatagtgc
 961 ccccccttgtg gtcggtgtac aggtggtgca tggctgtcgt cagctcgtgt cgtaagatgt
1021 tgggttaagt cccgcaacga gcgcaaccct tgtcccgtgt tgccagcaac tcttcggagg
1081 ttggggactc acgggagacc gccggggtca actcggagga aggtggggac gacgtcaagt
1141 catcatgccc cttatgtctt gggctgcaca cgtgctacaa tggccggtac aatgagctgc
1201 gataccgtga ggtggagcga atctcaaaaa gccggtctca gttcggattg gggtctgcaa
1261 ctcgacccca tgaagtcgga gtcgctagta atcgcagatc agcattgctg cggtgaatac
1321 gttcccgggc cttgtacaca ccgcccgtca cgtcacgaaa gtcggtaaca cccgaagccc
1381 gtggcccaac ccgcaaggga gggagcggtc gaaggtggga ctggcg
```

8. ORGANISM: *Streptomyces mashuensis*

```
   1 agagtttgat cctggctcag gacgaacgct ggcggcgtgc ttaacacatg caagtcgaac
  61 gatgaacctc cttcgggagg ggattagtgg cgaacgggtg agtaacacgt gggcaatctg
 121 ccctgcactc tgggacaagc cctggaaacg gggtctaata ccggatacga cacgcgaccg
 181 catggtccgc gtgtggaaag ctccggcggt gcaggatgag cccgcggcct atcagcttgt
 241 tggtgaggta atggctcacc aaggcgacga cgggtagccg gcctgagagg gcgaccggcc
 301 acactgggac tgagacacgg cccagactcc tacgggaggc agcagtgggg aatattgcac
 361 aatgggcgaa agcctgatgc agcgacgccg cgtgagggat gacggccttc gggttgtaaa
 421 cctctttcag cagggaagaa gcgaaagtga cggtacctgc agaagaagcg ccggctaact
 481 acgtgccagc agccgcggta atacgtaggg cgcaagcgtt gtccggaatt attgggcgta
 541 aagagctcgt aggcggcttg tcgcgtcgga tgtgaaagcc cggggcttaa ccccgggtct
 601 gcattcgata cgggcaggct agagttcggt aggggagatc ggaattcctg gtgtagcggt
 661 gaaatgcgca gatatcagga ggaacaccgg tggcgaaggc ggatctctgg gccgatactg
 721 acgctgagga gcgaaagcgt ggggagcgaa caggattaga taccctggta gtccacgccg
 781 taaacgttgg gcactaggtg tgggcaacat tccacgttgt ccgtgccgca gctaacgcat
 841 taagtgcccc gcctggggag tacggccgca aggctaaaac tcaaaggaat tgacgggggc
 901 ccgcacaagc agcggagcat gtggcttaat tcgacgcaac gcgaagaacc ttaccaaggc
 961 ttgacataca ccggaaacac tcagagatgg tgccccccttg tggtcggtgt acaggtggtg
1021 catggctgtc gtcagctcgt gtcgtgagat gttgggttaa gtcccgcaac gagcgcaacc
1081 cttgttctgt gttgccagca atcgcttcgg ggtgatgggg actcacagga gactgccggg
1141 gtcaactcgg aggaaggtgg ggacgacgtc aagtcatcat gccccttatg tcttgggctg
1201 cacacgtgct acaatggccg gtacaatgag ctgcgatacc gcgaggtgga gcgaatctca
1261 aaaagccggt ctcagttcgg attggggtct gcaactcgac cccatgaagt tggagttgct
1321 agtaatcgca gatcagcatt gctgcggtga atacgttccc gggccttgta cacaccgccc
1381 gtcacgtcac gaaagtcggt aacacccgaa gccggtggcc caacccttgt ggagggagcc
1441 gtcgaaggtg ggactggcga ttgggacgaa gtcgtaacaa ggtagccgta ccggaaggtg
1501 cggctggatc acctcctt
```

9. ORGANISM: *Streptomyces rimosus subsp. rimosus*

```
   1 gctcaggacg aacgctggcg gcgtgcttaa cacatgcaag tcgaacgatg aagcccttcg
  61 gggtggatta gtggcgaacg ggtgagtaac acgtgggcaa tctgccctgc actctgggac
 121 aagccctgga aacggggtct aataccggat atgacacacg accgcatggt ctgtgtgtgg
 181 aaagctccgg cggtgcagga tgagcccgcg gcctatcagc ttgttggtgg ggtaatggcc
 241 taccaaggcg acgacgggta gccggcctga gagggcgacc ggccacactg ggactgagac
 301 acggcccaga ctcctacggg aggcagcagt ggggaatatt gcacaatggg cgcaagcctg
 361 atgcagcgac gccgcgtgag ggatgacggc cttcgggttg taaacctctt tcagcaggga
 421 agaagcgcaa gtgacggtac ctgcagaaga agcgccggct aactacgtgc cagcagccgc
 481 ggtaatacgt agggcgcaag cgttgtccgg aattattggg cgtaaagagc tcgtaggcgg
 541 cttgtcgcgt cggatgtgaa agcccggggc ttaaccccgg gtctgcattc gatacgggca
```

```
 601 ggctagagtt cggtagggga gatcggaatt cctggtgtag cggtgaaatg cgcagatatc
 661 aggaggaaca ccggtggcga aggcggatct ctgggccgat actgacgctg aggagcgaaa
 721 gcgtggggag cgaacaggat tagataccct ggtagtccac gccgtaaacg ttgggaacta
 781 ggtgtgggcg acattccacg tcgtccgtgc cgcagctaac gcattaagtt ccccgcctgg
 841 ggagtacggc cgcaaggcta aaactcaaag gaattgacgg gggcccgcac aagcggcgga
 901 gcatgtggct taattcgacg caacgcgaag aaccttacca aggcttgaca tacaccggaa
 961 acctctggag acaggggccc ccttgtggtc ggtgtacagg tggtgcatgg ctgtcgtcag
1021 ctcgtgtcgt gagatgttgg gttaagtccc gcaacgagcg caacccttgt tctgtgttgc
1081 cagcatgcct ttcggggtga tggggactca caggagactg ccggggtcaa ctcggaggaa
1141 ggtggggacg acgtcaagtc atcatgcccc ttatgtcttg ggctgcacac gtgctacaat
1201 ggccggtaca atgagctgcg ataccgcgag gtggagcgaa tctcaaaaag ccggtctcag
1261 ttcggattgg ggtctgcaac tcgaccccat gaagtcggag tcgctagtaa tcgcagatca
1321 gcattgctgc ggtgaatacg ttcccgggcc ttgtacacac cgcccgtcac gtcacgaaag
1381 tcggtaacac ccgaagccgg tggcccaacc ccttgtggga gggaatcgtc gaaggtggga
1441 ctggcgattg ggacgaagtc gtaacaaggt agccgtaccg gaagg
```

10. ORGANISM: *Streptomyces violaceusniger*

```
   1 aacacatgca agtcgaacga tgaaccggtt tcggccgggg attagtggcg aacgggtgag
  61 taacacgtgg gcaatctgcc ctgcactctg ggacaagccc tggaaacggg gtctaatacc
 121 ggatatgact gccgaccgca tggtctggtg gtggaaagct ccggcggtgc aggatgagcc
 181 cgcggcctat cagcttgttg gtggggtgat ggcctaccaa ggcgacgacg ggtagccggc
 241 ctgagagggc gaccggccac actgggactg agacacggcc cagactccta cgggaggcag
 301 cagtggggaa tattgcacaa tgggcgcaag cctgatgcag cgacgccgcg tgagggatga
 361 cggccttcgg gttgtaaacc tctttcagca gggaagaagc gcaagtgacg gtacctgcag
 421 aagaagcgcc ggctaactac gtgccagcag ccgcggtaat acgtagggcg caagcgttgt
 481 ccggaattat tgggcgtaaa gagctcgtag gcggcttgtc gcgtcggatg tgaaagcccg
 541 gggcttaact ccgggtctgc attcgatacg ggcaggctag agttcggtag gggagatcgg
 601 aattcctggt gtagcggtga aatgcgcaga tatcaggagg aacaccggtg gcgaaggcgg
 661 atctctgggc cgatactgac gctgaggagc gaaagcgtgg ggagcgaaca ggattagata
 721 ccctggtagt ccacgccgta aacgttggga actaggtgtg ggcgacattc cacgttgtcc
 781 gtgccgcagc taacgcatta agttccccgc ctggggagta cggccgcaag gctaaaactc
 841 aaaggaattg acgggggccc gcacaagcgg cggagcatgt ggcttaattc gacgcaacgc
 901 gaagaacctt accaaggctt gacatacacc ggaaaaccct ggagacaggg tccccttgt
 961 ggtcggtgta caggtggtgc atggctgtcg tcagctcgtg tcgtgagatg ttgggttaag
1021 tcccgcaacg agcgcaaccc ttgttctgtg ttgccagcat gcctttcggg gtgatgggga
1081 ctcacaggag actgccgggg tcaactcgga ggaaggtggg gacgacgtca agtcatcatg
1141 ccccttatgt cttgggctgc acacgtgcta caatggccgg tacaatgagc tgcgaagccg
1201 tgaggtggag cgaatctcaa aaagccggtc tcagttcgga ttggggtctg caactcgacc
1261 ccatgaagtc ggagtcgcta gtaatcgcag atcagcattg ctgcggtgaa tacgttcccg
1321 ggccttgtac acaccgcccg tcacgtcacg aaagtcggta acacccgaag ccggtggccc
1381 aacccttgtg gagggagccg tcgaaggtgg gactggcgat tgggacgaag tcgtaacaag
1441 gtagccgtac cggaaggtgc ggctggatca cctccttaaa
```

11. ORGANISM: *Streptomyces ehimensis*

```
   1 cggcgtgctt aacacatgca agtcgaacga tgaagccctt cggggtggat tagtggcgaa
  61 cgggtgagta acacgtgggc aatctgccct gcactctggg acaagccctg gaaacggggt
 121 ctaataccgg atatgactac tgaccgcatg gttggtggtg gaaagctccg gcggtgcagg
 181 atgagcccgc ggcctatcag cttgttggtg gggtgatggc ctaccaaggc gacgacgggt
 241 agccggcctg agagggcgac cggccacact gggactgaga cacggcccag actcctacgg
 301 gaggcagcag tggggaatat tgcacaatgg gcgaaagcct gatgcagcga cgccgcgtga
 361 gggatgacgg ccttcgggtt gtaaacctct ttcagcaggg aagaagcgaa agtgacggta
 421 cctgcagaag aagcgccggc taactacgtg ccagcagccg cggtaatacg tagggcgcaa
 481 gcgttgtccg gaattattgg gcgtaaagag ctcgtaggcg gcttgtcgcg tcggatgtna
```

```
 541 aagcccgggg cttaaccccg ggtttgcatt cgatacgggc aggctagagt tcggtaaggg
 601 agatcggaat tcctggtgta gcggtaaatg cgcagatatc aggaggaaca ccggtggcga
 661 aggcggatct ctgggccgat actgacgctg aggagcgaaa gcgtggggag cgaacaggat
 721 tagataccct ggtagtccac gccgtaaacg ttgggaacta ggtgtgggcg acattccacg
 781 tcgtccgtgc cgcagctaac gcattaagtt ccccgcctgg ggagtacggc cgcaaggcta
 841 aaactcaaag gaattgacgg gggcccgcac aagcagcgga gcatgtggct taattcgacg
 901 caacgcgaag aaccttacca aggcttgaca tacaccggaa acggccagag atggtcgccc
 961 ccttgtggtc ggtgtacagg tggtgcatgg ctgtcgtcag ctcgtgtcgt gagatgttgg
1021 gttaagtccc gcaacgagcg caacccttgt cctgtgttgc cagcatgccc ttcggggtga
1081 tggggactca caggagactg ccggggtcaa ctcggaggaa ggtggggacg acgtcaagtc
1141 atcatgcccc ttatgtcttg ggctgcacac gtgctacaat ggccggtaca atgagctgcg
1201 atgccgtgag gtggagcgaa tctcaaaaag ccggtctcag ttcggattgg ggtctgcaac
1261 tcgaccccat gaagttggag ttgctagtaa tcgcagatca gcattgctgc ggtgaatacg
1321 ttcccgggcc ttgtacacac cgcccgtcac gtcacgaaag tcggtaacac ccgaagccgg
1381 tggcccaacc cnttgtggag ggagccgtcg aaggtggg
```

12. ORGANISM: *Streptomyces cinnamoneus*

```
   1 acgaacgctg gcggcgtgct taacacatgc aagtcgaacg atgaagccct tcggggtgga
  61 ttagtggcga acgggtgagt aacacgtggg caatctgccc ttcactctgg gacaagccct
 121 ggaaacgggg tctaataccg gatacgacct gccgaggcat ctcggcgggt ggaaagctcc
 181 ggcggtgaag gatgagcccg cggcctatca gcttgttggt ggggtaatgg cctaccaagg
 241 cgacgacggg tagccggcct gagagggcga ccggccacac tgggactgag acacggccca
 301 gactcctacg ggaggcagca gtggggaata ttgcacaatg ggcgaaagcc tgatgcagcg
 361 acgccgcgtg agggatgacg gccttcgggt tgtaaacctc tttcagcagg gaagaagcga
 421 gagtgacggt acctgcagaa gaagcgccgg ctaactacgt gccagcagcc gcggtaatac
 481 gtagggcgca agcgttgtcc ggaattattg ggcgtaaaga gctcgtaggc ggcttgttgc
 541 gtcggatgtg aaagcccggg gcttaacccc gggtctgcat tcgatacggg caggctagag
 601 ttcggtaggg gagatcggaa ttcctggtgt agcggtgaaa tgcgcagata tcaggaggaa
 661 caccggtggc gaaggcggat ctctgggccg atactgacgc tgaggagcga aagcgtgggg
 721 agcgaacagg attagatacc ctggtagtcc acgccgtaaa cgttgggaac taggtgtggg
 781 cgacattcca cgtcgtccgt gccgcagcta acgcattaag ttccccgcct ggggagtacg
 841 gccgcaaggc taaaactcaa aggaattgac gggggcccgc acaagcagcg gagcatgtgg
 901 cttaattcga cgcaacgcga agaaccttac caaggcttga catacaccgg aaacggccag
 961 agatggtcgc ccccttgtgg tcggtgtaca ggtggtgcat ggctgtcgtc agctcgtgtc
1021 gtgagatgtt gggttaagtc ccgcaacgag cgcaaccctt gtcctgtgtt gccagcatgc
1081 ccttcggggt gatggggact cacaggagac tgccggggtc aactcggagg aaggtgggga
1141 cgacgtcaag tcatcatgcc ccttatgtct tgggctgcac acgtgctaca atggccggta
1201 caatgagctg cgataccgcg aggtggagcg aatctcaaaa agccggtctc agttcggatt
1261 ggggtctgca actcgacccc atgaagttgg agttgctagt aatcgcagat cagcattgct
1321 gcggtgaata cgttcccggg ccttgtacac accgcccgtc acgtcacgaa agtcggtaac
1381 acccgaagcc ggtggcccaa cccttgtgga gggagccgtc gaaggtggga ctggcgattg
1441 ggacgaagtc gtaacaaggt agccgtaccg gaagg
```

13. ORGANISM: *Streptomyces albireticuli*

```
   1 cggcgtgctt aacacatgca agtcgaacga tgaagccctt cggggtggat tagtggcgaa
  61 cgggtgagta acacgtgggc aatctgccct gcactctggg acaagccctg gaaacggggt
 121 ctaataccgg ataatacctg ccgaggcatc tcggtgggtt gaaagctccg gcggtgcagg
 181 atgagcccgc ggcctatcag cttgttggtg gggtgatggc ctaccaaggc gacgacgggt
 241 agccggcctg agagggcgac cggccacact gggactgaga cacggcccag actcctacgg
 301 gaggcagcag tggggaatat tgcacaatgg gcgaaagcct gatgcagcga cgccgcgtga
 361 gggatgacgg ccttcgggtt gtaaacctct ttcagcaggg aagaagcgaa agtgacggta
 421 cctgcagaag aagcgccggc taactacgtg ccagcagccg cggtaatacg tagggcgcaa
 481 gcgttgtccg gaattattgg gcgtaaagag ctcgtaggcg gcttgttgcg tcggatgtga
```

```
 541 aagcccgggg cttaaccccg ggtctgcatt cgatacgggc aggctagagt gtggtagggg
 601 agatcggaat tcctggtgta gcggtgaaat gcgcagatat caggaggaac accggtggcg
 661 aaggcggatc tctgggccat tactgacgct gaggagcgaa agcgtgggga gcgaacagga
 721 ttagataccc tggtagtcca cgccgtaaac gttgggaact aggtgttggc gacattccac
 781 gtcgtcggtg ccgcagctaa cgcattaagt tccccgcctg gggagtacgg ccgcaaggct
 841 aaaactcaaa ggaattgacg ggggcccgca caagcagcgg agcatgtggc ttaattcgac
 901 gcaacgcgaa gaaccttacc aaggcttgac atataccgga aacggccaga gatggtcgcc
 961 cccttgtggt cggtatacag gtggtgcatg gctgtcgtca gctcgtgtcg tgagatgttg
1021 ggttaagtcc cgcaacgagc gcaaccctttg ttctgtgttg ccagcatgcc cttcggggtg
1081 atggggactc acaggagact gccggggtca actcggagga aggtggggac gacgtcaagt
1141 catcatgccc cttatgtctt gggctgcaca cgtgctacaa tggccggtac aatgagctgc
1201 gataccgtga ggtggagcga atctcaaaaa gccggtctca gttcggattg gggtctgcaa
1261 ctcgacccca tgaagttgga gttgctagta atcgcagatc agcattgctg cggtgaatac
1321 gttcccgggc cttgtacaca ccgcccgtca cgtcacgaaa gtcggtaaca cccgaagccg
1381 gtggcccaac ccttgtggag ggagccgtcg aaggtgggac tggcgattgg ga
```

14. ORGANISM: *Streptomyces netropsis*

```
   1 gacgaacgct ggcggcgtgc ttaacacatg caagtcgaac gatgaagcct ttcggggtgg
  61 attagtggcg aacgggtgag taacacgtgg gcaatctgcc cttcactctg ggacaagccc
 121 tggaaacggg gtctaatacc ggatacgacc tgcctccgca tgggggtggg tggaaagctc
 181 cggcggtgaa ggatgagccc gcggcctatc agcttgttgg tggggtaatg gcctaccaag
 241 gcgacgacgg gtagccggcc tgagagggcg accggccaca ctgggactga gacacggccc
 301 agactcctac gggaggcagc agtggggaat attgcacaat gggcgaaagc ctgatgcagc
 361 gacgccgcgt gagggatgac ggccttcggg ttgtaaacct ctttcagcag ggaagaagcg
 421 agagtgacgg tacctgcaga agaagcgccg gctaactacg tgccagcagc cgcggtaata
 481 cgtagggcgc aagcgttgtc cggaattatt gggcgtaaag agctcgtagg cggcttgttg
 541 cgtcggatgt gaaagcccgg ggcttaaccc cgggtctgca ttcgatacgg gcaggctaga
 601 gtgtggtagg ggagatcgga attcctggtg tagcggtgaa atgcgcagat atcaggagga
 661 acaccggtgg cgaaggcgga tctctgggcc attactgacg ctgaggagcg aaagcgtggg
 721 gagcgaacag gattagatac cctggtagtc cacgccgtaa acgttgggaa ctaggtgttg
 781 gcgacattcc acgtcgtcgg tgccgcagct aacgcattaa gttccccgcc tggggagtac
 841 ggccgcaagg ctaaaactca aaggaattga cgggggcccg cacaagcagc ggagcatgtg
 901 gcttaattcg acgcaacgcg aagaacctta ccaaggcttg acatataccg gaaacggcca
 961 gagatggtcg ccccttgtg gtcggtatac aggtggtgca tggctgtcgt cagctcgtgt
1021 cgtgagatgt tgggttaagt cccgcaacga gcgcaaccct tgttctgtgt tgccagcatg
1081 cccttcgggg tgatggggac tcacaggaga ctgccggggt caactcggag gaaggtgggg
1141 acgacgtcaa gtcatcatgc cccttatgtc ttgggctgca cacgtgctac aatggccggt
1201 acaatgagct gcgataccgt gaggtggagc gaatctcaaa aagccggtct cagttcggat
1261 tggggtctgc aactcgaccc catgaagttg gagttgctag taatcgcaga tcagcattgc
1321 tgcggtgaat acgttcccgg gccttgtaca caccgcccgt cacgtcacga aagtcggtaa
1381 cacccgaagc cggtggccca acccttgtgg agggagccgt cgaaggtggg actggcgatt
1441 gggacgaag
```

15. ORGANISM: *Streptomyces subrutilus*

```
   1 agagtttgat cctggctcag gacgaacgct ggcggcgtgc ttaacacatg caagtcgaac
  61 gatgaagccc ttcggggtgg attagtggcg aacgggtgag taacacgtgg gcaatctgcc
 121 cttcactctg ggacaagccc tggaaacggg gtctaatacc ggataccact cctgtctgca
 181 tgggcagggg ttgaaagctc cggcggtgaa ggatgagccc gcggcctatc agcttgttgg
 241 tggggtaatg gcccaccaag gcgacgacgg gtagccggcc tgagagggcg accggccaca
 301 ctgggactga gacacggccc agactcctac gggaggcagc agtggggaat attgcacaat
 361 gggcgaaagc ctgatgcagc gacgccgcgt gagggatgac ggccttcggg ttgtaaacct
 421 ctttcagcag ggaagaagcg aaagtgacgg tacctgcaga agaagcgccg gctaactacg
 481 tgccagcagc cgcggtaata cgtagggcgc aagcgttgtc cggaattatt gggcgtaaag
```

```
 541 agctcgtagg cggcttgtca cgtcggatgt gaaagcccga ggcttaacct cgggtctgca
 601 ttcgatacgg gctagctaga gtgtggtagg ggagatcgga attcctggtg tagcggtgaa
 661 atgcgcagat atcaggagga acaccggtgg cgaaggcgga tctctgggcc attactgacg
 721 ctgaggagcg aaagcgtggg gagcgaacag gattagatac cctggtagtc cacgccgtaa
 781 acgttgggaa ctaggtgttg gcgacattcc acgtcgtcgg tgccgcagct aacgcattaa
 841 gttccccgcc tggggagtac ggccgcaagg ctaaaactca aaggaattga cgggggcccg
 901 cacaagcagc ggagcatgtg gcttaattcg acgcaacgcg aagaacctta ccaaggcttg
 961 acatataccg gaaagcatta gagatagtgc ccccttgtg gtcggtatac aggtggtgca
1021 tggctgtcgt cagctcgtgt cgtgagatgt tgggttaagt cccgcaacga gcgcaaccct
1081 tgtcctgtgt tgccagcatg ccttcggggt gatggggact cacaggagac cgccggggtc
1141 aactcggagg aaggtgggga cgacgtcaag tcatcatgcc ccttatgtct tgggctgcac
1201 acgtgctaca atggccggta caatgagctg cgataccgtg aggtggagcg aatctcaaaa
1261 agccggtctc agttcggatt ggggtctgca actcgacccc atgaagtcgg agttgctagt
1321 aatcgcagat cagcattgct gcggtgaata cgttcccggg ccttgtacac accgcccgtc
1381 acgtcacgaa agtcggtaac acccgaagcc ggtggcccaa cccgtaaggg agggagctgt
1441 cgaaggtggg actggcgatt gggacgaagt cgtaacaagg tagccgtacc ggaaggtgcg
1501 gctggatcac ctccttt
```

16. ORGANISM: *Streptomyces griseus subsp. griseus*

```
   1 caagtcgaac gatgaagcct ttcggggtgg attagtggcg aacgggtgag taacacgtgg
  61 gcaatctgcc cttcactctg ggacaagccc tggaaacggg gtctaatacc ggataacact
 121 ctgtcccgca tgggacgggg ttaaaagctc cggcggtgaa ggatgagccc gcggcctatc
 181 agcttgttgg tggggtaatg gcctaccaag gcgacgacgg gtagccggcc tgagagggcg
 241 accggccaca ctgggactga gacacggccc agactcctac gggaggcagc agtggggaat
 301 attgcacaat gggcgaaagc ctgatgcagc gacgccgcgt gagggatgac ggccttcggg
 361 ttgtaaacct ctttcagcag ggaagaagcg agagtgacgg tacctgcaga agaagcgccg
 421 gctaactacg tgccagcagc cgcggtaata cgtagggcgc aagcgttgtc cggaattatt
 481 gggcgtaaag agctcgtagg cggcttgtca cgtcggatgt gaaagcccgg ggcttaaccc
 541 cgggtctgca ttcgatacgg gctagctaga atgtggtagg ggagatcgga attcctggtg
 601 tagcggtgaa atgcgcagat atcaggagga acaccggtgg cgaaggcgga tctctgggcc
 661 attactgacg ctgaggagcg aaagcgtggg gagcgaacag gattagatac cctggtagtc
 721 cacgccgtaa acgttgggaa ctaggtgttg gcgacattcc acgtcgtcgg tgccgcagct
 781 aacgcattaa gttccccgcc tggggagtac ggccgcaagg ctaaaactca aaggaattga
 841 cgggggcccg cacaagcagc ggagcatgtg gcttaattcg acgcaacgcg aagaacctta
 901 ccaaggcttg acatataccg gaaagcatca gagatggtgc cccccttgtg gtcggtatac
 961 aggtggtgca tggctgtcgt cagctcgtgt catgagatgt tgggttaagt cccgcaacga
1021 gcgcaaccct tgttctgtgt tgccagcatg cccttcgggg tgatggggac tcacaggaga
1081 ctgccggggt caactcggag gaaggtgggg acgacgtcaa gtcatcatgc cccttatgtc
1141 ttgggctgca cacgtgctac aatggccggt acaatgagct gcgatgccgc gaggcggagc
1201 gaatctcaaa aagccggtct cagttcggat tggggtctgc aactcgaccc catgaagtcg
1261 gagttgctag taatcgcaga tcagcattgc tgcggtgaat acgttcccgg gccttgtaca
1321 caccgcccgt cacgtcacga aagtcggtaa cacccgaagc cggtggccca acccttgtg
1381 ggagggagct gtcgaaggtg ggactggcga ttgggacgaa gtcgtaacaa ggtagccgta
1441 ccggaagg
```

17. ORGANISM: *Streptomyces cinereus*

```
   1 gtgcttaaca catgcaagtc gaacgatgaa cccgcttcgg tgggggatta gtggcgaacg
  61 ggtgagtaac acgtgggcaa tctgccctcc actccgggac aagccctgga aacggggtct
 121 aataccggat atcacttcca ccctcctggg tgggggttga aagctccggc ggtggaggat
 181 gagcccgcgg cctatcagct ggttggtgag gtaacggctc accaaggcga cgacgggtag
 241 ccggcctgag agggcgaccg gccacactgg gactgagaca cggcccagac tcctacggga
 301 ggcagcagtg gggaatattg cacaatgggc gcaagcctga tgcagcgacg ccgcgtgggg
 361 gatgacggcc ttcgggttgt aaacctcttt cagcagggaa gaagcgaaag tgacggtacc
```

```
 421 tgcagaagaa gcgccggcta actacgtgcc agcagccgcg gtaatacgta gggcgcaagc
 481 gttgtccgga attattgggc gtaaagagct cgtaggcggc ttgtcacgtc gggtgtgaaa
 541 gccccggggct taaccccggg tctgcattcg atacgggctg gctggagtgt ggtaggggag
 601 atcggaattc ctggtgtagc ggtgaaatgc gcagatatca ggaggaacac cggtggcgaa
 661 ggcggatctc tgggccatta ctgacgctga ggagcgaaag cgtggggagc gaacaggatt
 721 agataccctg gtagtccacg ccgtaaacgg tgggaactag gtgttggcga cattccacgt
 781 cgtcggtgcc gcagctaacg cattaagttc cccgcctggg gagtacggcc gcaaggctaa
 841 aactcaaagg aattgacggg ggcccgcaca agcagcggag catgtggctt aattcgacgc
 901 aacgcgaaga accttaccaa ggcttgacat cgcccggaaa gcatcagaga tggtgccccc
 961 cttgtggccg ggtgacaggt ggtgcatggc tgtcgtcagc tcgtgtcgtg agatgttggg
1021 ttaagtcccg caacgagcgc aacccttgtc ccgtgttgcc agcaactctc ttcggagggg
1081 ttggggactc acgggagacc gccggggtca actcggagga aggtggggac gacgtcaagt
1141 catcatgccc cttatgtctt gggctgcaca cgtgctacaa tggccggtac aatgagctgc
1201 gataccgcaa ggtggagcga atctcaaaaa gccggtctca gttcggattg gggtctgcaa
1261 ctcgacccca tgaagtcgga gttgctagta atcgcagatc agcagtgctg cggtgaatac
1321 gttcccgggc cttgtacaca ccgcccgtca cgtcacgaaa gtcggtaaca cccgaagccc
1381 gtggcccaac cagcttgctg gggggagcgg tcgaaggtgg gactggcgat tgggacgaag
1441 tcgtaacaag gt
```

18. ORGANISM: *Streptomyces flaveus*

```
   1 gatcctggct caggacgaac gctggcggcg tgcttaacac atgcaagtcg aacgatgaag
  61 cccttcgggg tggattagtg gcgaacgggt gagtaacacg tgggcaatct gccctccact
 121 tcgggacaag ccctggaaac ggggtctaat accggatagc actcccgccc tcctgggtgg
 181 gggttgaaag ctccggcggt ggaggatgag cccgcggcct atcagctggt tggtgaggta
 241 acggctcacc aaggcgacga cgggtagccg gcctgagagg gcgaccggcc acactgggac
 301 tgagacacgg cccagactcc tacgggaggc agcagtgggg aatattgcac aatgggcgca
 361 agcctgatgc agcgacgccg cgtgggggat gacggccttc gggttgtaaa cctctttcag
 421 cagggaagaa gccctagggt gacggtacct gcagaagaag cgccggctaa ctacgtgcca
 481 gcagccgcgg taatacgtag ggcgcaagcg ttgtccggaa ttattgggcg taaagagctc
 541 gtaggcggct tgtcacgtcg ggtgtgaaag cccggggctt aaccccgggt ctgcattcga
 601 tacgggctgg ctggagtgtg gtaggggaga tcggaattcc tggtgtagcg gtgaaatgcg
 661 cagatatcag gaggaacacc ggtggcgaag gcggatctct gggccattac tgacgctgag
 721 gagcgaaagc gtggggagcg aacaggatta gataccctgg tagtccacgc cgtaaacggt
 781 gggaactagg tgttggcgac attccacgtc gtcggtgccg cagctaacgc attaagttcc
 841 ccgcctgggg agtacggccg caaggctaaa actcaaagga attgacgggg gcccgcacaa
 901 gcagcggagc atgtggctta attcgacgca acgcgaagaa ccttaccaag gcttgacatc
 961 gcccggaaag catcagagat ggtgcccccc ttgtggccgg gtgacaggtg gtgcatggct
1021 gtcgtcagct cgtgtcgtga gatgttgggt taagtcccgc aacgagcgca acccttgtcc
1081 cgtgttgcca gcaacggttt cggccggttg gggactcacg ggagaccgcc ggggtcaact
1141 cggaggaagg tggggacgac gtcaagtcat catgcccctt atgtcttggg ctgcacacgt
1201 gctacaatgg ccggtacaat gagcggcgat accgcaaggt ggagcgaatc tcaaaaagcc
1261 ggtctcagtt cggattgggg tctgcaactc gaccccatga agtcggagtt gctagtaatc
1321 gcagatcagc agtgctgcgg tgaatacgtt cccgggcctt gtacacaccg cccgtcacgt
1381 cacgaaagtc ggtaacaccc gaagcccgtg gcccaacccc cttgtgggga gggagcggtc
1441 gaaggtggga ctggcgattg ggacgaagtc gtaacaaggt agccgtaccg gaaggtgcgg
1501 c
```

19. ORGANISM: *Streptomyces lavendulae*

```
   1 agtttgatcc tggctcagga cgancgctgg cggcgtnctt aanacatgta ngtcgaacga
  61 tgaagccctt cggggtggat tagtggcgaa cgggtgagta acacgtgggc aatctgccct
 121 tcactctggg acaagccctg gaaacggggt ctaataccgg ataccactcc tgcccgcatg
 181 ggcgggggtt gaaagctccg gcggtgaagg atgagcccgc ggcctatcag cttgttggtg
 241 gggtaatggc ccaccaaggc gacgacgggt agccggcctg agagggcgac cggccacact
```

```
 301 gggactgaga cacggcccag actcctacgg gaggcagcag tggggaatat tgcacaatgg
 361 gcgaaagcct gatgcagcga cgccgcgtga gggatgacgg ccttcgggtt gtaaacctct
 421 ttcagcaggg aagaagcgaa agtgacggta cctgcagaag aagcgccggc taactacgtg
 481 ccagcagccg cggtaatacg tagggcgcaa gcgttgtccg gaattattgg gcgtaaagag
 541 ctcgtaggcg gcttgtcacg tcggatgtga aagcccgagg cttaacctcg ggtctgcatt
 601 cgatacgggc tagctagagt ntggtagggg agatcggaat tcctggtgta gcggtgaaat
 661 gcgcagatat caggaggaac accggtggcg aaggcggatc tctgggccat tactgacgct
 721 gaggagcgaa agcgtgggga gcgaacagga ttagataccc tggtagtcca cgccgtaaac
 781 gttgggaact aggtgttggc gacattccac gtcgtcggtg ccgcagctaa cgcattaagt
 841 tccccgcctg gggagtacgg ccgcaaggct aaaactcana ggaattgacg ggggcccgca
 901 caagcggcgg agcatntggc ttaattcgac gcancgngaa gaaccttacc aaggcttgac
 961 atataccgga aagnattaga gatagtgccc cccttgtggt cggnatacag gtggtgcatg
1021 gctgtcgtca gctcgtgtcg tgagatgttg ggttaagtcc cgcaacgngn gcaacccttg
1081 tcctgtgttg ccagcatgcc cttcggggtg atggggactc acaggagacc gccggggtca
1141 actcggagga aggtggggac gacgtcaagt catcatgccc cttatgtctt gggctgcaca
1201 cgtgctacaa tggccggtac aatgagctgc gataccgtga ggtggagcgn atctcaaaaa
1261 gccggtntca gttcggattg gggtctgcaa ctcgacccca tgaagtcgga gtcgctagta
1321 atcgcagatc agcattgctg cggtgaatac gttcccgggc cttgtacaca ccgcccgtca
1381 cgtcacgaaa gtcggtaaca cccgaagccg gtggcccaac ccgtaaggag ggagctgtcg
1441 aaggtgggac tggcgattgg gacgaagtcg taacaaggtn gccgtaccgg aaggtgcggc
1501 tggatcacct cctt
```

20. ORGANISM: *Streptomyces pseudoechinosporeus*

```
   1 gacgaacgct ggcggcgtgc ttaacacatg caagtcgaac gatgaagccc ttcggggtgg
  61 attagtggcg aacgggtgag taacacgtgg gcaatctgcc cttcactctg ggacaagccc
 121 tggaaacggg gtctaatacc ggatacgacc tgccgaggca tctcggcggg tggaaagctc
 181 cggcggtgaa ggatgagccc gcggcctatc agcttgttgg tggggtaatg gcctaccaag
 241 gcgacgacgg gtagccggcc tgagagggcg accggccaca ctgggactga gacacggccc
 301 agactcctac gggaggcagc agtggggaat attgcacaat gggcgaaagc ctgatgcagc
 361 gacgccgcgt gagggatgac ggccttcggg ttgtaaacct ctttcagcag ggaagaagcg
 421 agagtgacgg tacctgcaga agaagcgccg gctaactacg tgccagcagc cgcggtaata
 481 cgtagggcgc aagcgttgtc cggaattatt gggcgtaaag agctcgtagg cggcttgttg
 541 cgtcggatgt gaaagcccgg ggcttaaccc cgggtctgca ttcgatacgg gcaggctaga
 601 gttcggtagg ggagatcgga attcctggtg tagcggtgaa atgcgcagat atcaggagga
 661 acaccggtgg cgaaggcgga tctctgggcc gatactgacg ctgaggagcg aaagcgtggg
 721 gagcgaacag gattagatac cctggtagtc cacgccgtaa acgttgggac taggtgtggg
 781 cgacattcca cgtcgtccgt gccgcagcta acgcattaag ttccccgcct ggggagtacg
 841 gccgcaaggc taaaactcaa aggaattgac gggggcccgc acaagcagcg gagcatgtgg
 901 cttaattcga cgcaacgcga agaaccttac caaggcttga catacaccgg aaacggccag
 961 agatggtcgc ccccttgtgg tcggtgtaca ggtggtgcat ggctgtcgtc agctcgtgtc
1021 gtgagatgtt gggttaagtc ccgcaacgag cgcaaccctt gtcctgtgtt gccagcatgc
1081 ccttcggggt gatggggact cacaggagac tgccggggtc aactcggagg aaggtgggga
1141 cgacgtcaag tcatcatgcc ccttatgtct tgggctgcac acgtgctaca atggccggta
1201 caatgagctg cgataccgcg aggtggagcg aatctcaaaa agccggtctc agttcggatt
1261 ggggtctgca actcgacccc atgaagttgg agttgctagt aatcgcagat cagcattgct
1321 gcggtgaata cgttcccggg ccttgtacac accgcccgtc acgtcacgaa agtcggtaac
1381 acccgaagcc ggtggcccaa cccttgtgga gggagccgtc gaaggggga ctggcgattg
1441 ggacgaag
```

21. ORGANISM: *Sporichthya polymorpha*

```
   1 tgatcctggc tcaggacgaa cgctggcggc gtgcttaaca catgcaagtc gancggtgaa
  61 ccaccttcgg gtggggatca gtggcgaacg ggtgagtaac acgtgggcaa cctgccccta
 121 gctctgggat aactccggga aaccggagct aataccggat atgacaccga gcggcatcgc
 181 tcggtgtgga aagtttttcg gctagggatg ggcccgcggc ctatcagctt gttggtgggg
 241 taacggccta ccaaggcgac gacgggtagc cggcctgaga gggcgaccgg ccacactggg
 301 actgagacac ggcccagact cctacgggag gcagcagtgg ggaatattgc gcaatgggcg
 361 aaagcctgac gcagcgacgc cgcgtgaggg acgaaggcct tcgggtcgta aacctctttc
 421 agcagggacg aagcgcaagt gacggtacct gcagaagaag caccggctaa ctacgtgcca
 481 gcagccgcgg taatacgtag ggtgcaagcg ttgtccggaa ttattgggcg taaagagctc
 541 gtaggcggct tgtcacgtct gctgtgaaaa ctcggggctc aaccccgagc ctgcagtgga
 601 tacgggctag ctagagtgcg gtaggggaga ctggaattcc tggtgtagcg gtgaaatgcg
 661 cagatatcag gaggaacacc ggtggcgaag gcgggtctct gggccgatac tgacgctgag
 721 gagcgaaagc gtggggagcg aacaggatta gataccctgg tagtccacgc cgtaaacgtt
 781 gggcgctagg tgtggggatc tttccacgat ctccgtgccg cagctaacgc attaagcgcc
 841 ccgcctgggg agtacggccg caaggctaaa actcaaagga attgacgggg gccgcacaag
 901 cggcggagca tgtggcttaa ttcgacgcaa cgcgaagaac cttaccaagg cttgacatat
 961 accgaaactg gcagagatgt caggtccnca agggcggtat acaggtggtg catggttgtc
1021 gtcagctcgt gtcgtgagat gttgggttaa gtcccgcaac gagcgcaacc ctcgttctat
1081 gttgccagcg cgtaatggcg gggactcata ggagactgcc ggggtcaact cggaggaagg
1141 tggggatgac gtcaaatcat catgcccctt atgtcttggg ctgcacacat gctacaatgg
1201 ccggtacaaa gggctgcgat accgcaaggt ggagcgaatc ccaaaaagcc ggtctcagtt
1261 cggattgggg tctgcaactc gaccccatga agtcggagtc gctagtaatc gcagatcagc
1321 aacgctgcgg tgaatacgtt cccgggcctt gtacacaccg cccgtcacgt cacgaaagtc
1381 ggttacaccc gaaaccggtg gcccnaccct tttggaggga accgtcgaag gtgggactgg
1441 cgatt
```

22. ORGANISM: *Sporichthya brevicatena*

```
   1 gacgaacgct ggcggcgtgc tttacacatg caagtcgaac gtgaaccact tcgggtgggg
  61 atcagtggcg aacgggtgag taacacgtgg gcaacctgcc cctagctctg ggataactcc
 121 gggaaaccgg agctaatacc ggatatgaca tcgagcggca tcgctcgatg tggaaagttt
 181 ttcggctagg aatgggcccg cggcctatca gcttgttggt ggggtaacgg cctaccaagg
 241 cgacgacggg tagccggcct gagagggcga ccggccacac tgggactgag acacggccca
 301 gactctacgg gaggcagcag tggggaatat tgcgcaatgg gcgaaagcct gacgcagcga
 361 cgccgcgtga gggacgaagg cttcgggtcg taaacctctt tcagcaggga cgaagcgaaa
 421 gtgacggtac ctgcagaaga agcaccggct aactacgtgc cagcagccgc ggtaatacgt
 481 agggtgcaag cgttgtccgg aattattggg cgtaaagagc tcgtaggcgg cttgtcacgt
 541 ctgctgtgaa aactcggggc tcaaccccga gcctgcagtg gatacgggct agctagagtg
 601 cggtagggga gactggaatt cctggtgtag cggtgaaatg cgcagatatc aggaggaaca
 661 ccggtggcga aggcgggtct ctggaccgat actgacgctg aggagcgaaa gcgtggggag
 721 cgaacaggat tagataccct ggtagtccac gccgtaaacg ttgggcgcta ggtgtgggat
 781 ctttccacga tctccgtgcc gcastaacgc attaagcgcc ccgcctgggg agtacggccg
 841 caaggctaaa actcaaagga attgacgggg gcccgcacaa gcggcggagc atgtggctta
 901 attcgacgca acgcgaagaa ccttaccaag gcttgacata tagggaaaac tggcagagat
 961 gncaggtccg caagggccct atacaggtgg tgcatggttg tcgtcagctc gtgtcgtgag
1021 atgttgggtt aagtcccgca acgagcgcaa ccctcgttct atgttgccag cgcgtaatgg
1081 cggggactca taggagactg ccggggtcaa ctcggaggaa ggtggggatg acgtcaaatc
1141 atcatgcccc ttatgtcttg ggctgcacac atgctacaat ggccggtaca aagggctgcg
1201 ataccgcaag gtggagcgaa tcccaaaaag ccggtctcag ttcggattgg ggtctgcaac
1261 tcgaccccat gaagtcggag tcgctagtaa tcgcagatca gcaacgctgc ggtgaatacg
1321 ttcccgggcc ttgtacacac cgcccgtcac gtcacgaaag tcggtaacac ccgaagccgg
1381 tggcccaacc cttgtggagg gagccgtcg
```