Supplementary Information

Figure S1. Chrome azurol S assay results of compound **1**–**3**. All experiments were performed triplicate and values are average of three (error bar: SD).

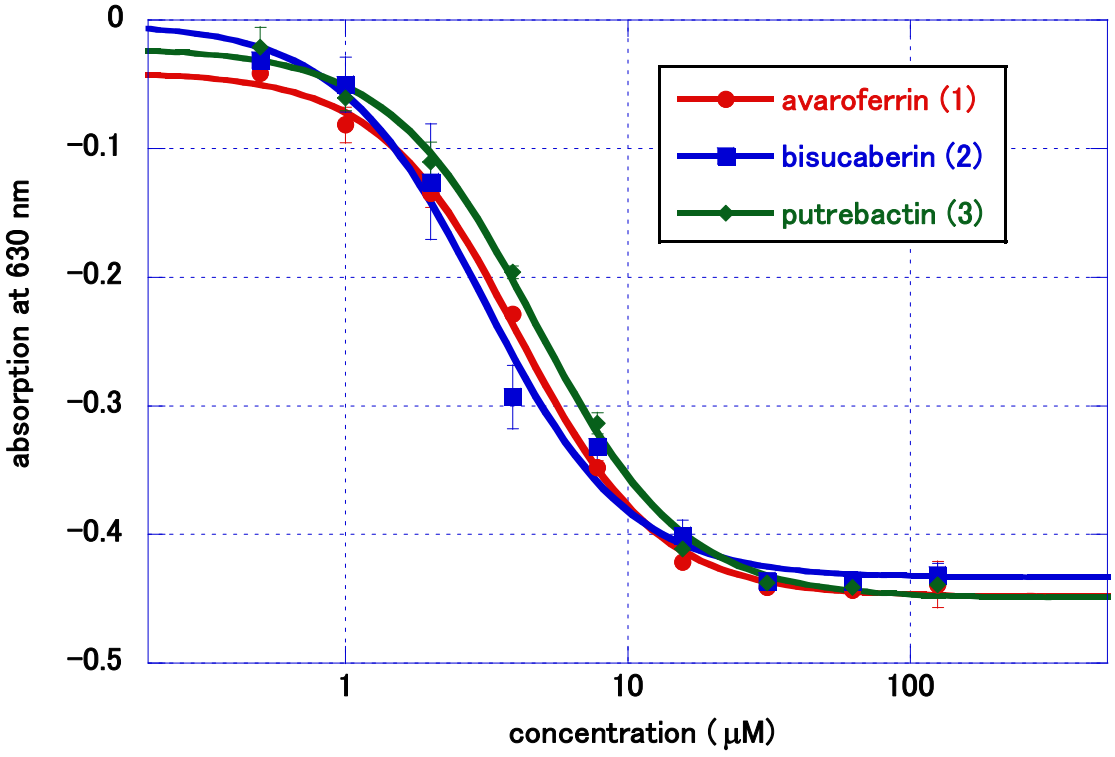

Figure S2. Selected ion current LC-MS chromatogram of the culture broths of the marine metagenome originated *mbsA-C* clone (**a**) and vector only clone (**b**). *MbsA-C* clone exhibited ion peaks of compounds **4** and **5**, while peaks corresponding to condensed products **1**–**3**, and **6**–**8** were absent.

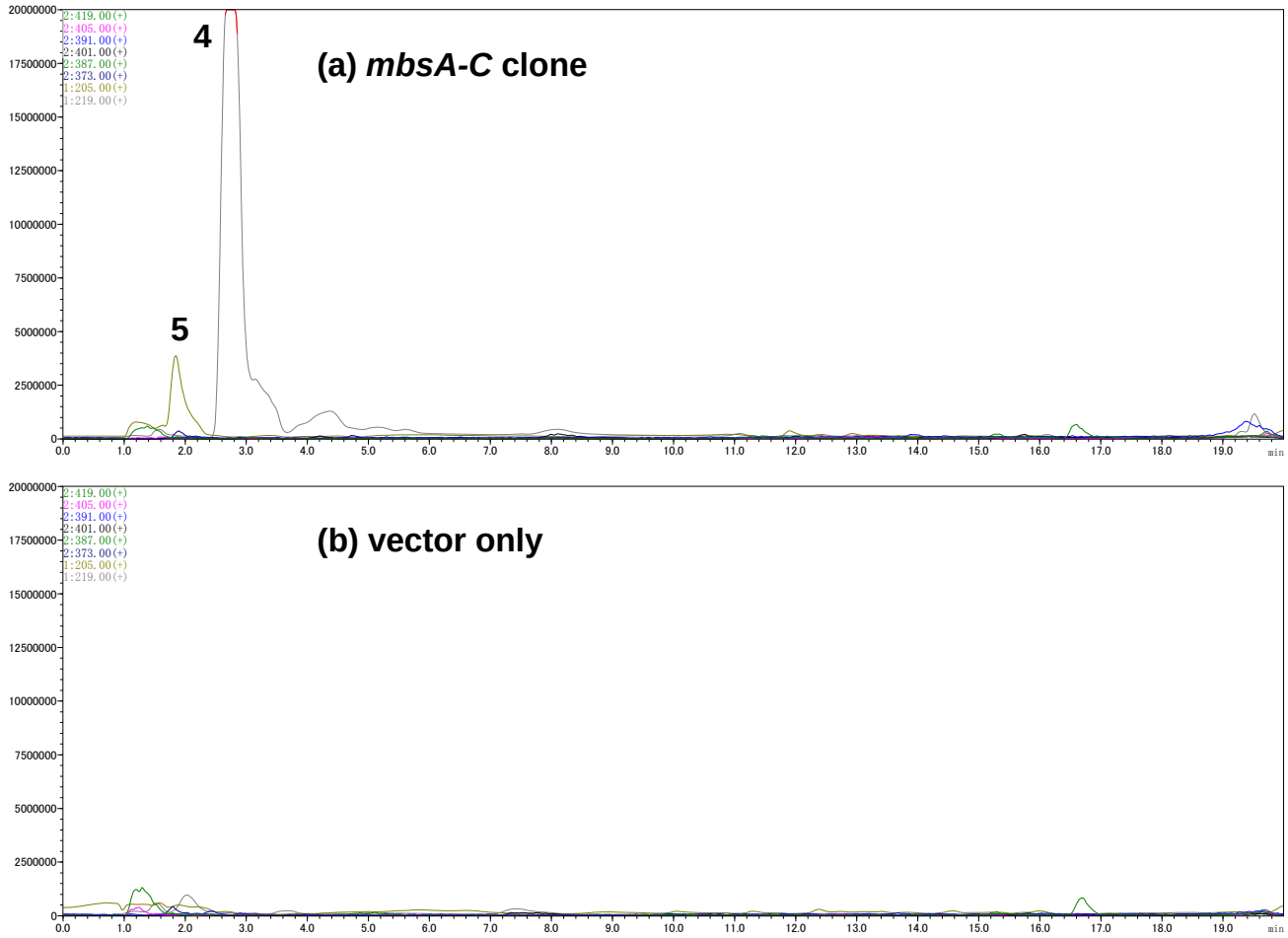

Figure S3. ^{1}H NMR spectru of avaroferrin (**1**) in CD_3OD + DMSO-d_6.

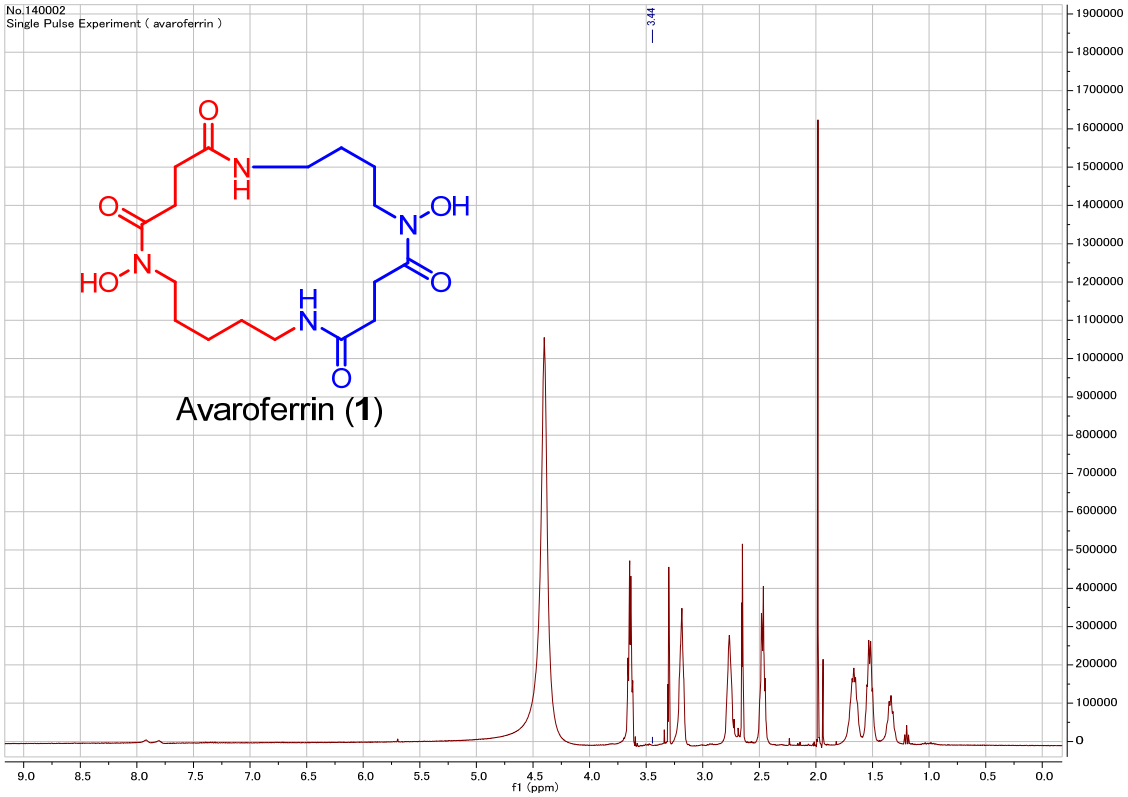

Figure S4. ^{13}C NMR spectrum of avaroferrin (**1**) in CD_3OD + DMSO-d_6.

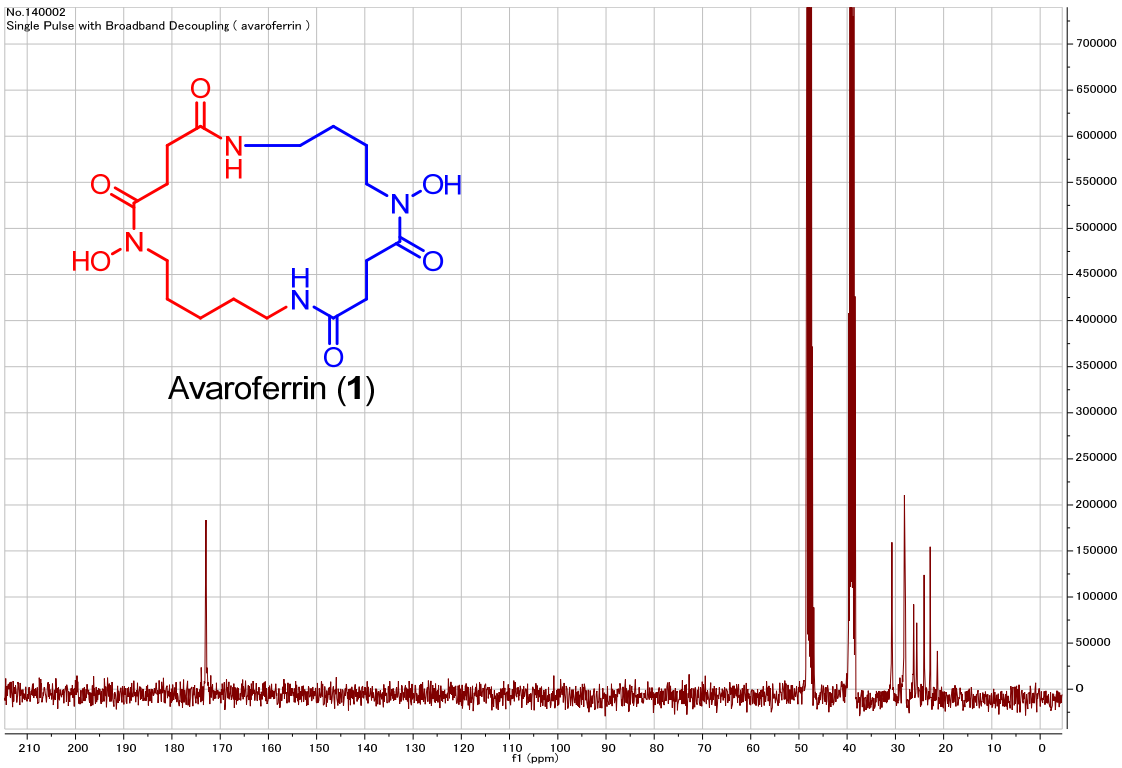

Figure S5. High Resolution ESI MS spectra of avaroferrin (**1**).

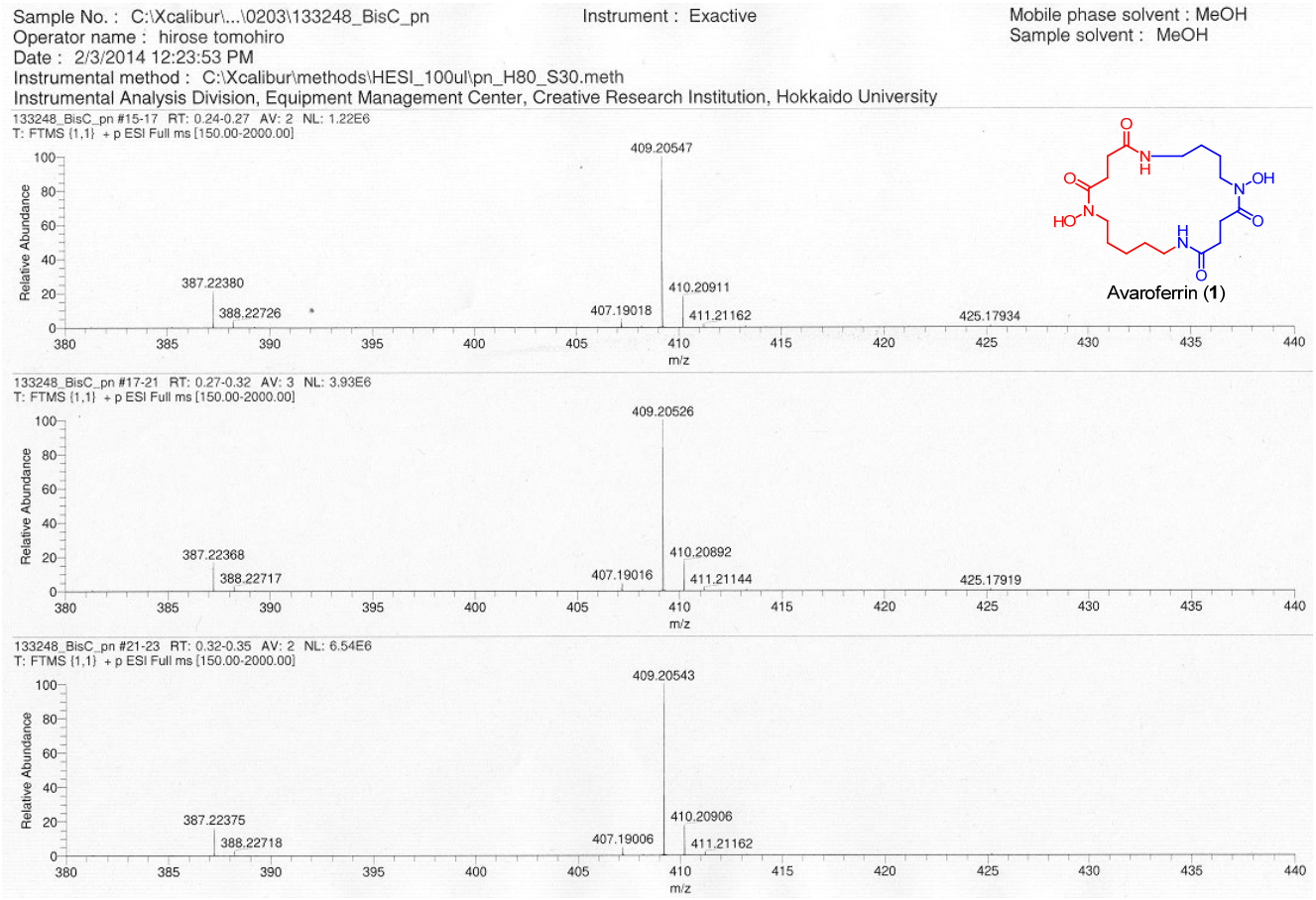

Figure S6. ^{1}H NMR spectrum of putrebactin (**3**) in CD_3OD + DMSO-d_6.

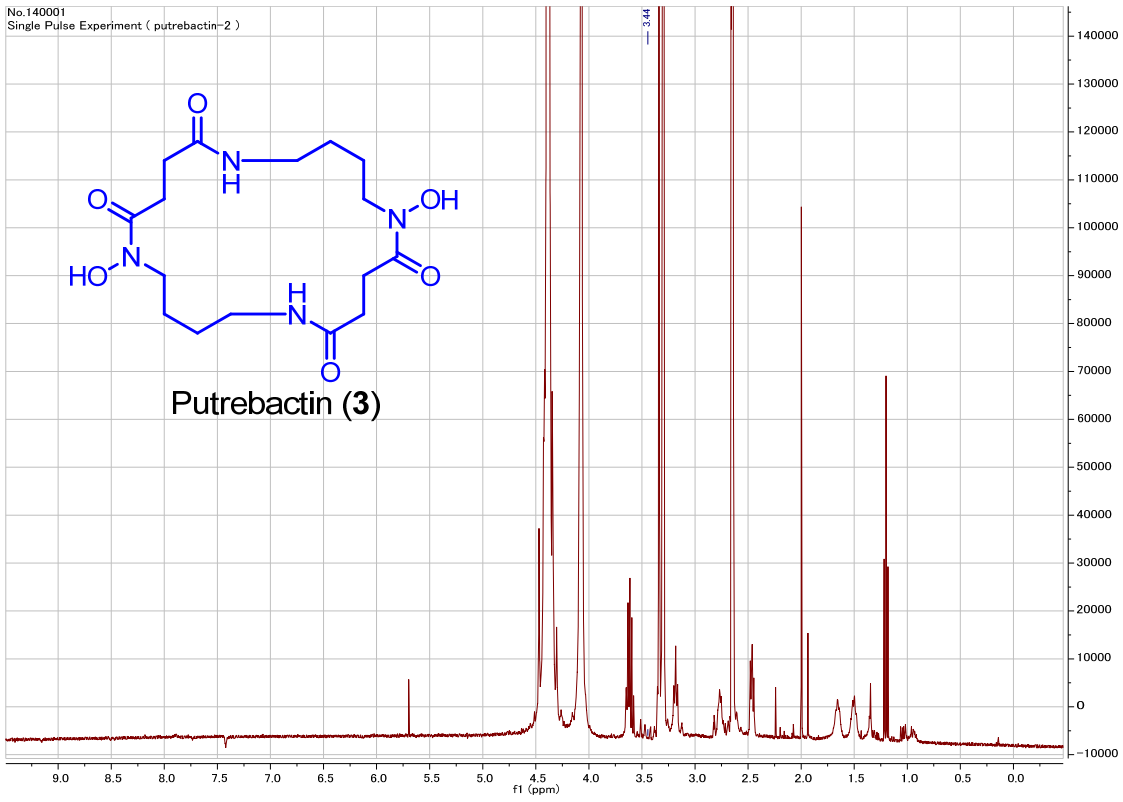

Figure S7. High resolution ESI MS spectra of putrebactin (**3**).

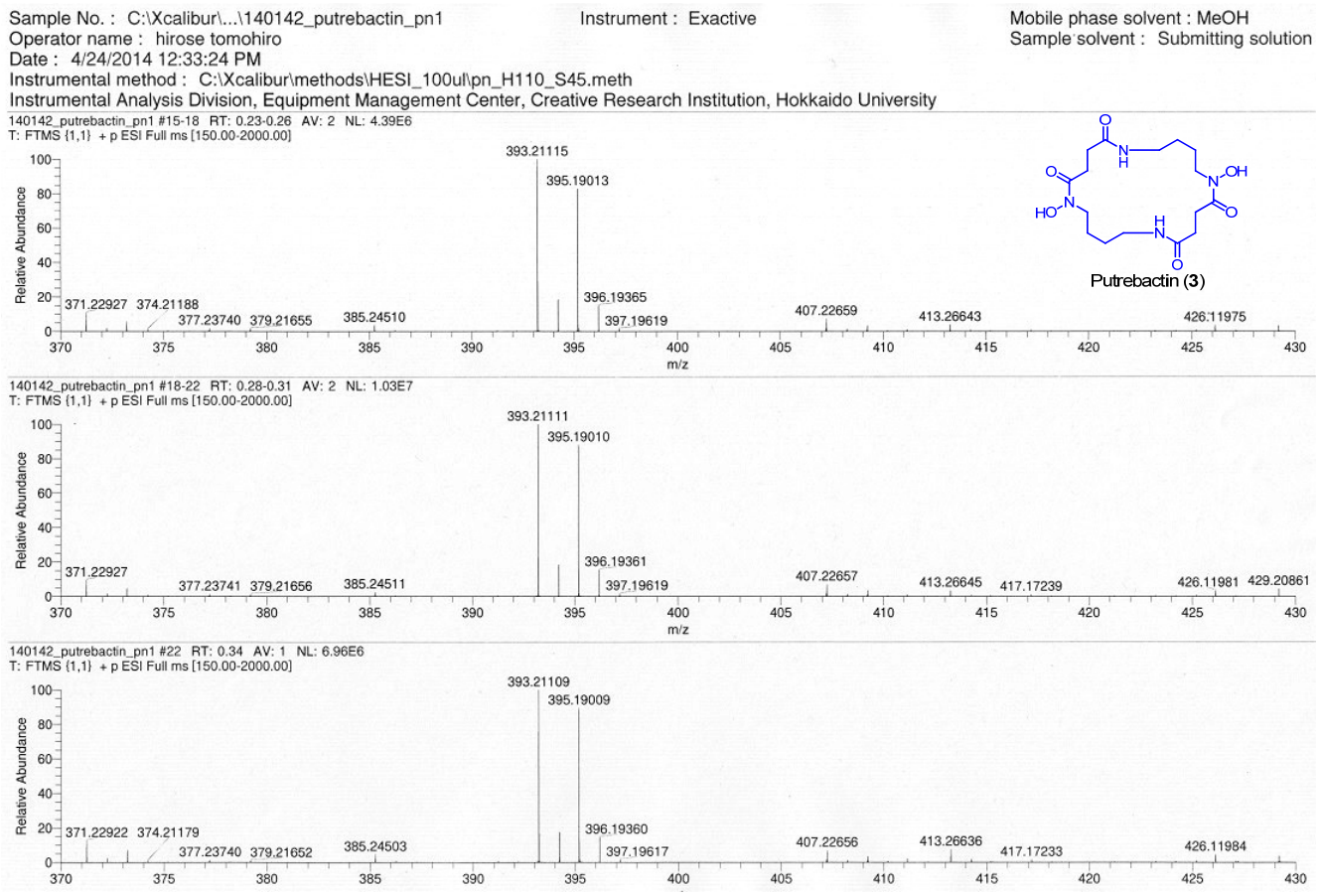

Table S1. Amino acid sequence homology and most abundant products.

	BibC^{C}	PutC	Major Product
MbsD	63%	64%	bisucaberin (**2**)
BibC^{C}		59%	bisucaberin B (**7**)
PutC			putrebactin (**3**)
AvaD^{a}			avaroferrin (**1**)

AvaD^{a}: sequence data not shown.

S1. DNA sequence of synthetic *bibC*^{C} gene

GTCGACATGAAGAATAGCAGCAAGAATCCAAGTTTGAGCTTGGCCACGTCACATCTGACC
ACTGAATACTGGCACAAGGCAAATCAACATCTGATCGCAAAGATGATCACGGAACTGTCGC
ACGAACAGATCATAACACCGATAAAGTTAGACGACGCGTCAAACGCCCAAGCTGCTAGTT
GGTGTATAACCTTTAACTCTGATACCGGTACCTCAGAGTATTTGTTCCGCGCTCGGCAATAC
CAACTGGATCATCTGTTCGTAGAGCCTCAATCCATTACCTGTACTAAGGATGATAAGAACCA
ACCGCTGGATGCCGTTTCCTTTATCCTGAGTTGTAGACATTTGCTTGAAATTAGTGACGCGT
TGCTTCCGACGTACCTGGAAGAGATTACGAGTACGTTATATAGCAAAGCCTATAAGCTTATG
CATCAAAATAAGACCTCCGCCCAATTAGCCAACGCGTCATACCAAGAGATAGAAGCAGCAA
TGACAGAAGGACATCCCGTTTTCATAGCGAATAATGGAAGAATAGGTTTCGATATGTTAGAC

CACGTGGAATTTAGCCCTGAATCAGGTCAGTCCCTGAACTTACAGTGGATCGCAGTGTTAA
GAGAGAAGACCTCCTTTGCGGTTATAGAATCACTGTCGTACGATAGACTTATCTTCGATGAA
TTGGGTCAGTCTCAGCTTAACGAATTCAACCAGCAACTGTCGATGCAGGGTTTAGAACCCT
CTCACTACTACCTTATGCCTATCCACCCGTGGCAATGGAGAGAAAAGATTTCACGGATATTC
GCGGCGGATATTGCAAACCAGTATGTAGTGCCATTGGGAACTACGGAAGATAAGTATCAAG
CACAGCAGAGTATTCGGACTTTCTTCAATTTAAGCTCGCCGGAGAAATGTTACGTGAAGAC
GGCGCTTTCTATTCTGAATATGGGTTTCATGCGTGGGCTTTCTCCTTATTATATGAGCCGGAC
CCCGGCTATTAACACCTTCATCGCAAATTTGATTGAGACTGACCCGTACTTCGCTAAGAAGC
AGTTCTTCGTTTTAAAGGAAGTAGCAGCGATCGGCTACCACCATTCCTACTACGAGCAAGC
TACGCGGACTGATAATCCGTATAAGAAGATGCTGTCTAGTCTTTGGCGGGAGTCGCCCTATG
CTCCAGATCAACACGGAAATGTACTGGTGAACAAGCAGCAGAAATTGTTAACTATGGCCTC
CTTGTTGCATGTGGATGATCAGGGAAAATCACTGATATCAGCCCTGATGGCCGACTCTCCAC
TTAGTGATCACAACTGGCTGAAGCAGTACATGGATTTATACTTGCAACCACTGCTGCATAGC
TTCTTTGCCTATGATTTGGTTTTCATGCCCCATGGTGAGAATCTGATTCTGGTATTAGAGGAC
AATTCTCCCATCAAGATAATTATGAAGGATATCGGAGAAGAGGTGGCGATCCTTAACGGGG
AAAAGACACTTCCAAACGATATGAACTGCTTGGCAGTCGATCTGGAAGACCCTATGAAACT
GAACTACATCTTGCTGGATATATTCGATTGTATCTTCCGCTTCATAGCACCTTTACTGGAGCA
ACAGACTCAAGTTTCAGAGAGCGACTTCTGGGAAATCGTTGCTGATTCAGTCAAGGATTAC
CAACAGGAGCATCCGCAGTTTGATGCGAAATATCAGCGGTACGATTTGTACTGCTCTAGCTT
CGCGCGGACATGTTTGAATCGTATCCAGCTTAATAATAATCAGCAAATGATCGACCTGGAGG
ATAGAGAGAAGAATCTTAGATTTGCCGAGGATATCGCAAATCCACTGGCATTGTTTGCTAAG
ACACATCGTATCATCGGGCCC

S2. DNA sequence of synthetic *pubC* gene

GTCGACATGAATCTGGCAACCAATCGTGCGTTACTGAAGCCGTTTACGCAGGCCGAGTTTC
CGACTCTGGAAGCGGCAGCACATCCGCATGTTCCGGCACATTTGATGCCGGAATACTGGCA
AGCAGCAAATCGCCATCTGGTGAAGAAAATCCTGTGTGAATTCACCCACGAGAAAATTATC
AGCCCGCAAATCTATCGTCAAGCAGCCGGGATTAACCACTATGAACTGCGCCTGAAAGATT
GCACCTATTACTTCTCGGCCCGCCATTATCAATTGGATCATCTCGAAATTGAGGCTGGTAGC
ATCCGCGTGTCAAGTGCGGGCCAGGATAAACCGCTGGATGCGATGTCCTTAATTATCAAGC
TGAAAGACGCTCTGGGTATGTCAGAGACATTACTGCCGACCTATCTTGAGGAAATCACCTC
GACCCTTTACAGCAAAGCTTACAAATTGGCGCATCAAGCGATTCCTGCTACAACTCTGGCG
AAAGCGGATTATCAGACGATTGAGGCGGGTATGACGGAAGGACACCCAGTTTTCATTGCGA
ACAATGGTCGTATTGGCTTTGACATGCAGGATTATGATCAGTTTGCACCAGAAAGCGCTTCG
GCACTCCAGTTGGTTTGGATTGCGGTTCGCAAAGACAAGACCACCTTCAGCTCTTTGGAA
GGTCTGGATCATGACTCTCTGCTTAAACAGGAACTGGGTGAACAGTTCACGAAATTTCAGC
AGCACCTGTCGGCTTTAGGTCAAGCGGCAGATTCGTTTTACTTCATGCCGGTTCACCCATG
GCAGTGGCGTGAGAAAATTGCCCGTACATTTGCCGGCGAAATTGCGCGTGGGGATATCATT
TATCTGGGCGAAAGTCAGGACTGTTACCAGGTCCAACAGTCGATCCGGACCTTCTTCAACT
TATCTGCGCCACAGAAGTGCTACGTGAAAACCGCCCTGAGCATCCTCAACATGGGGTTTAT
GCGTGGCTTATCTCCGCTGTATATGAGCTGTACGCCCCAGATCAACGCTTGGGTTGCGGATC

TCATTGAATCCGACTCCTATTTTGCGGAACAAGGCTTCGTCATTCTCAAAGAAATCGCAGCC
ATTGGTTATCACCATCGCTACTATGAGGAAGCATTGACTCAAGACTCAGCTTACAAGAAAAT
GCTTTCTGCGCTGTGGCGCGAGTCCCCTCTGCCGCATATTGAACCACAGCAAACGCTGATG
ACGATGGCTGCCTTACTGCATGTGGACCACCAAGAACAGGCCTTGTTGGCCGCGCTGATCA
AACACAGTGGCTTAAGCGCGAAAGAATGGGTCAAACGGTATCTGAATCTGTATCTGAGTCC
GTTGCTGCACGCTTTCTTTGCCTACGATCTTGTCTTTATGCCTCATGGCGAAAACCTTATTCT
GGTCTTGGATGCAGGCATTCCCGTGAAAATCCTGATGAAAGACATTGGAGAGGAAGTAGC
CGTGCTGAACGGGTCCGAACCCCTCCCGCAAGAGGTACAGCGTCTGGCGGTGGAACTTGA
AGAAGAGATGAAACTGAACTACATTCTCCTGGATATCTTTGATTGCATTTTCCGCTATCTTGC
CCCGATTCTGGATAAACAGACCGAAGTGAGTGAGGCGCAGTTTTGGGAATTAGTAGCGGAT
AATGTGCGTGATTACCAAGCCCAGCATCCGCAGTTAGCCGACAAGTTCGCTCAATATGACC
TGTTCAAAGATAGCTTTGTACGCACTTGCCTGAATCGCATCCAGCTCAACAACAACCAGCA
AATGATCGATCTGGCCGATCGCGAAAAGAATCTGCGCTTTGCGGGTGGCATTGACAATCCT
CTGGCCGCATTTCGCCAGTCACACGCCTTTGGAAACCAGAAACTGAAACCCAAAAGCGGG
CCC