Co-culture of Marine Invertebrate-Associated Bacteria and Interdisciplinary Technologies Enable Biosynthesis and Discovery of a New Antibiotic, Keyicin

Navid Adnani,[1] Marc G. Chevrette,[2,3] Srikar N. Adibhatla,[1] Fan Zhang,[1] Qing Yu,[1] Doug R. Braun,[1] Justin Nelson,[4] Scott W. Simpkins,[4] Bradon R. McDonald,[2] Chad L. Myers,[4,5] Jeff S. Piotrowski,[6] Christopher J. Thompson,[7] Cameron R. Currie,[2] Lingjun Li,[1] Scott R. Rajski,[1] Tim S. Bugni[1,*]

[1] Pharmaceutical Sciences Division, School of Pharmacy, University of Wisconsin, Madison, Wisconsin 53705, United States

[2] Department of Bacteriology, University of Wisconsin, Madison, Wisconsin 53705, United States

[3] Department of Genetics, University of Wisconsin, Madison, Wisconsin 53705, United States

[4] Bioinformatics and Computational Biology Program, University of Minnesota-Twin Cities, Minneapolis, Minnesota 55455, United States

[5] Department of Computer Science and Engineering, University of Minnesota-Twin Cities, Minneapolis, Minnesota 55455, United States

[6] Yumanity Therapeutics, Cambridge, Massachusetts 02139, United States

[7] Bruker Daltonics, Billerica, Massachusetts 01821, United States

Table of Contents

EXPERIMENTAL PROCEDURES

Bacterial Strain Cultivation

Strains WMMB-235 and WMMA-185 were isolated from marine ascidian (*Ecteinascidia turbinata*) and sponge (*Chondrilla nucula*) specimens, respectively, from the Florida Keys, FL USA.[1, 2] Voucher specimens of both ascidians and sponges used in this study were housed at the University of Wisconsin-Madison. For cultivation, a sample of invertebrate (1 cm^3) was rinsed with sterile seawater, macerated with a sterile pestle in a microcentrifuge tube, and diluted with sterile seawater. Each dilution was plated separately on three media: ISP2 (4 g yeast extract, 10 g malt extract and 4 g dextrose per liter of artificial seawater), R2A (0.5g yeast extract, 0.5g peptone, 0.5 g casamino acids, 0.5 g dextrose, 0.5 g soluble starch, 0.3 g sodium pyruvate, 0.3 g K_2HPO_4, 0.05 g $MgSO_4$, 15 g Agar in 1 L ASW), and M4 (0.1 g L-asparagine, 0.5 g K_2HPO_4, 0.001 g $FeSO_4$, 0.1 g $MgSO_4$, 2 g peptone, 4 g sodium propionate, 20 g NaCl, 15 g Agar into 1 L ddH_2O). Each medium was supplemented with 50 μg/mL cycloheximide and 25 μg/mL nalidixic acid and incubated at 28 °C for at least 28 d. Nearly full length 16S rDNA sequencing was performed using previously described protocols.[3] Bacterial samples generated in this fashion were subsequently subjected to previously described microscale fermentation and extraction procedures[4] ultimately leading to the identification of antibacterial activities reflective of keyicin production.

Antibiotic Activity Screening

Supernatant from culture plates were tested against *B. subtilis*, *E. coli*, Methicillin-sensitive *S. aureus* (MSSA), *P. aeruginosa*, and *S. cerevisiae* using an agar-based antibiotic assay. Methods were modified from a previously reported yeast halo assay.[5] Seed cultures of each screening strain were grown overnight in 10 mL of LB media (10g Tryptone, 5 g Yeast extract, 10 g NaCl into 1 L ddH_2O)(25 x 150 mm tubes). To prepare uniform lawns for screening, 400 μL of overnight culture was inoculated into 200 mL of cation-adjusted Mueller-Hinton agar (CAMHA) (1.5 g soluble starch, 17.5 g casein, 3 g beef extract, 15 g agar, 12.5 mg Mg^{2+} and 25 mg Ca^{2+} in 1 L milli-Q H_2O) and maintained at 50–55 °C. For each screening plate, 30 mL of inoculated agar was poured into OmniTray (Thermo Scientific, Waltham, MA) and cooled for 30 min. From 96-well format, 5 μL of extract was spotted onto the agar. Screening plates were incubated at 37 °C overnight and subsequently visually observed for zones of inhibition.

Sample Processing for UHPLC/HRESI-qTOF-MS Analysis of Extracts

Half of the total crude extract was split into a designated plate for chemical analysis. A solution of 10:1 H_2O:MeOH (250 μL) was added to each well containing dried extracts. Solubilized extracts were transferred to 1 dram vials and diluted to a final volume of 1 mL using 10:1 H_2O:MeOH. Using a Gilson GX-271 liquid handling system, 900 μL was subjected to automated solid phase extraction (SPE). Extracts were loaded onto pre-conditioned (1 mL MeOH followed by 1 mL H_2O) EVOLUTE ABN SPE cartridges (25 mg absorbent mass, 1 mL reservoir volume; Biotage,

Charlotte, NC). Samples were subsequently washed using H_2O (1 mL) to remove media components, and eluted with MeOH (500 μL) directly into an LC/MS-certified vial.

UHPLC/HRESI-qTOF-MS Analysis of Extracts

LC/MS data were acquired using a Bruker MaXis ESI-qTOF mass spectrometer (Bruker, Billerica, MA) coupled with a Waters Acquity UPLC system (Waters, Milford, MA) operated by Bruker Hystar software. A gradient comprised of MeOH and H_2O (containing 0.1% formic acid) was used on an RP C-18 column (Phenomenex Kinetex 2.6μm, 2.1 x 100 mm; Phenomenex, Torrance, CA) at a flow rate of 0.3 mL/min. The method consisted of a linear gradient from MeOH/ H_2O (10%/90%) to MeOH/ H_2O (97%/3%) in 12 min, then held for 2 min at MeOH/ H_2O (97%/3%). Full scan mass spectra (*m*/*z* 150–1550) were measured in positive ESI mode. The mass spectrometer was operated using the following parameters: capillary, 4.5 kV; nebulizer pressure, 1.2 bar; dry gas flow, 8.0 L/min; dry gas temperature, 205 °C; scan rate, 2 Hz. Tune mix (ESI-L low concentration; Agilent, Santa Clara, CA) was introduced through a divert valve at the end of each chromatographic run for automated internal calibration. Bruker DataAnalysis 4.2 software was used for analysis of chromatograms.

PCA of LC/MS Data

Peak picking and bucketing (table generation) of LC/MS data and PCA was performed using Bruker ProfileAnalysis 2.0 software. These methods and supporting procedures have been previously described.[6]

Isolation of Keyicin (1)

A total of 10 L (20 × 500 mL) of co-culture were grown in ASW-D medium (2 g yeast extract, 5 g malt extract and 2 g dextrose in 1 L ASW) for 14 d. Unfiltered cultures were extracted with $CHCl_3$ (3 times using 1:1 ratio). The $CHCl_3$ extract (1.4 g) was subjected to benchtop C18 column fractionation (MeOH: H_2O, 10%-100%, 10% increments). A portion (18 mg of 599 mg) of the material containing **1** (60-80% MeOH: H_2O) was subjected to RP HPLC (60/40% to 100/0% MeOH-ammonium acetate 10 mM in 35 min) using a Phenomenex Luna Phenyl-hexyl column (250 × 10 mm, 5 μm). Fractions containing **1** (9 mg) were subjected to RP HPLC (60/40% to 90/10% MeOH-ammonium acetate 10 mM in 90 min) using Phenomenex Luna C18 column (250 × 10 mm, 5 μm). Fractions containing **1** (6 mg) were subjected to RP HPLC (70/30% to 80/20% MeOH-ammonium acetate 10 mM in 90 min) using Phenomenex Luna C18 column (250 × 10 mm, 5 μm) and yielded **1** (3.7 mg, RT 27 min).

Keyicin (1): Red solid; $[\alpha]^{25}_D$ + 20 (*c* 0.1, MeOH); UV (MeOH) λ (log ε) 206 (3.54), 237 (3.59), 260 (3.28), 293(2.91), 480 (3.08); IR (ATR) υ_{max} 3207, 3060, 2940, 2835, 2360, 2341, 2162, 1900, 1664, 1547, 1404, 1342, 1284, 1253, 1017, 926 cm^{-1}; ^1H and ^{13}C NMR (See Supporting Information, **Table S1**); HRMS $[M+2H]^{2+}$ *m*/*z* 805. 34954 (calcd for $C_{75}H_{108}N_4O_{34}$, 805.34954).

FT-ICR Analysis

The provided sample was re-dissolved in 100 mL MeOH. A 10 mL aliquot of this solution was diluted in MeOH:H_2O:Formic Acid (1:1:0.1) to a final volume of 1 mL. Additionally, 10 mL of a 10 mg/mL Arginine solution was spiked into the final dilution. FT-ICR MS data was acquired using a 12T solariX-XR Fourier transform ion cyclotron resonance (ICR) mass spectrometer (Bruker, Billerica, MA). The mass spectrum was measured in broadband mode over *m*/*z* 350-5,000 using positive ESI mode. Data was collected using 16 MW data points, summed over 300 scans and post-processed into absorption mode. The data was internally re-calibrated using the spiked-in Arginine clusters, with a standard deviation of <15 ppb. The doubly charged monoisotopic peak was observed at *m*/*z* 805.34955 with a resolving power of 2,190,560. At this resolution, isotopic fine structure was easily observed in the A+1, A+2, A+3 and A+4 isotopes.

Media Study

Media study was performed using ASW-A (20 g soluble starch, 10 g glucose, 5 g peptone, 5 g yeast extract, 5 g $CaCO_3$ per liter of ASW), ASW-D (2 g yeast extract, 5 g malt extract and 2 g dextrose per liter of ASW), ISP2 (4 g yeast extract, 10 g malt extract and 4 g dextrose per liter of artificial seawater), and M1 (10 g soluble starch, 2 g peptone and 4 g yeast extract per liter ASW) media. Cultures (500 μL) were grown in detoxified polypropylene square 96-deepwell microplates (Enzyscreen, The Netherlands).

Cell Contact Study

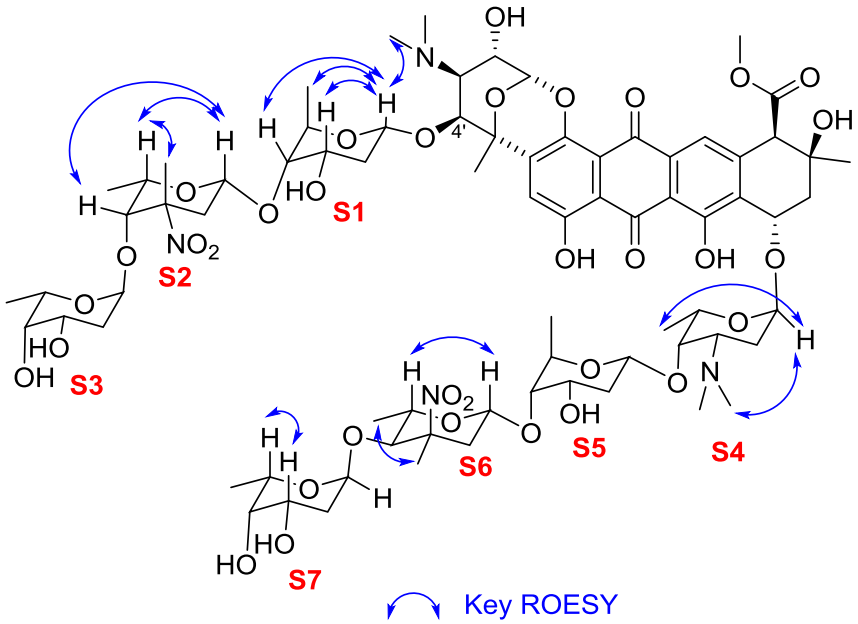
Baffled Erlenmeyer flasks (500 mL) were customized to interconnect with each other. A 0.2 μm nylon filter was placed between the flasks. One flask was inoculated with 3 mL of WMMB-235 (*Micromonospora* sp.) in 100 mL of ASW-D and the other connected flask was inoculated with 1 mL of WMMA-185 (*Rhodococcus* sp.) in 100 mL of ASW-D (recipe above). Cultures were grown for 7 d at 30 ºC and 200 rpm. A 1 mL aliquot was removed from each side of the modified fermentation system daily for LC/MS analysis. Another 1 mL aliquot was removed and diluted 1000-fold to assess bacterial growth. From each diluted aliquot, 100 μL was transferred to ASW-A agar (recipe above) and incubated for 14 d.

Determination of Minimum Inhibitory Concentration (MIC)

Test organisms *B. subtilis*, *E. coli* (ATCC 25922), and methicillin-sensitive *S. aureus* (MSSA) (ATCC 29213) were sub-cultured overnight on LB agar.[7] Several colonies were transferred to normal saline and adjusted to McFarland values of 0.5 for Gram-positive *B. subtilis* and MMSA, and 1.5-2 for Gram-negative *E. coli*. From each bacterial suspension, 100 μL was transferred into 9.9 mL of CAMHB (1.5 g soluble starch, 17.5 g casein, 3 g beef extract, 12.5 mg Mg^{2+} and 25 mg Ca^{2+} in 1 L milli-Q H_2O). A total of 50 μL diluted bacterial suspension was added to 150 μL of CAMHB and treated with test compound. Test compound was dissolved in DMSO, and serially diluted in 10 concentrations (128-0.25 μg/mL). Eight untreated media controls were included on each plate.

Plates were incubated at 37 ºC for 18 h. The MIC was determined as the lowest concentration that inhibited visible growth of bacteria.

Elucidation of S1–S7 relative configurations (on basis of NMR data that follow)



Key ROESY correlations enabling elucidation of sugar configurations are shown above and figured into our stereochemical logic as follows. For S1 ROESY correlations of H-1' with H-3', H-4', and H$_3$-6' suggested these protons adopted the same orientations, therefore establishing the relative configuration of S1. On the basis of comparisons of ^{13}C chemical shifts between S1 and S5 it could be deciphered that S5 has the same relative configuration as S1.

position	S1	S5
1'	101.1	101.1
2'	34.8	35.2
3'	66.3	66.3
4'	82.8	82.9
5'	68.8	68.6
6'	17.3	17.4

The relative configuration of S2 was determined by ROESY correlations. The ROESY correlation of H-1' with H-4' and H-5' suggested these protons adopted the same orientations. The ROESY correlation of H$_3$-6' with H$_3$-7' (the methyl group attached to C-3') placed these protons on the same face of the ring (cis-configured). The relative configurations of S3 and S7 were determined on the basis of comparisons of ^{13}C chemical shifts with well-established 2-deoxy-L-fucose (deFUC).[8,9]

position	S3	S7	deFUC
1'	102.9	103.1	99.1
2'	33.8	33.8	33.0
3'	66.7	66.7	65.9
4'	72.2	72.3	71.6
5'	68.7	69.1	68.4
6'	17.2	17.1	17.9

The relative configuration of S4 was determined on the basis of ROESY correlations and comparison of its ^{13}C chemical shifts with those of L-Rhodosamine in aclacinomycin A.[10] ROESY correlations of H-1' with H-6' and H_3-NCH_3 revealed their spatial proximity. The stereogenic center at C-4' was determined by comparison of its ^{13}C chemical shifts with those of aclacinomycin A.

position	S4	L-Rhodosamine
1'	101.9	101.6
2'	30.1	29.3
3'	63.9	61.6
4'	75.5	74.1
5'	69.9	66.8
6'	18.5	17.0
NCH_3	44.6	43.3

The relative configuration of S6 was determined by ROESY correlations and comparison of its ^{13}C chemical shifts with those of L-decilonitrose (DEC) in arugomycin.[8,9] The ROESY correlations of H-1' with H_3-6', and H_3-6' with H_3-7' (the methyl group attached to C-3') placed these protons on the same face of the ring. The stereogenic center at C-4' was determined on the basis of comparison of its ^{13}C chemical shifts with L-decilonitrose (DEC) in arugomycin.

position	S6	DEC
1'	101.1	99.7
2'	42.6	41.9
3'	90.3	89.5
4'	84.9	83.6
5'	71.8	70.6
6'	19.0	18.6
CH_3	25.5	24.9

Molecular Modeling and DFT Calculations (as applied to S1–S7 relative configurations)

Molecular modeling calculations were performed on a Dell Precision T5500 Linux workstation with a Xeon processor (3.3 GHz, 6-core). A library of low-energy conformers (MMFF, 10000 conformers examined) was obtained within 10 kcal. Each of the low energy (as determined by molecular mechanics) conformers was subsequently subjected to energy analysis using DFT to establish relative energies for a Boltzmann distribution. For structures that would contribute greater than 5% of the conformer population, NMR calculations were performed (B3LYP/6-31G**) using Spartan '14.[11] Molecules were modeled in the gas phase. Carbon chemical shifts (calculated vs. experimental) were compared using the DP4 probability method.[12] The results of these studies were used to ensure the legitimacy of S1–S7 configurational assignments derived from NMR data.

Genomic DNA Extraction for PacBio Sequencing

Strains WMMB-235 (*Micromonospora* sp.) and WMMA-185 (*Rhodococcus* sp.) were cultured in ASW-A media at 28 ºC and 200 rpm for 10 d. Sufficient culture was centrifuged for 60 s at 14,000 rpm to yield ~100 μL packed cells. Supernatants were discarded and cells were washed with 1 mL of 10.3% sucrose solution. Centrifugation was repeated and cells were resuspended in

450 μL TSE containing lysozyme (5 mg/mL). The solution was incubated for one hour, with tubes inverted occasionally, at 37 ºC. Proteinase k (20 mg/mL, 13 μL) was added and incubated for an additional 20 min at 37 ºC. SDS (10%, 45 μL) and 180 μL of TE was added and tubes were inverted until cells became clear and viscous. Phenol:chloroform:isoamyl alcohol (25:24:1, 350 μL) were added and shaken until uniformly cloudy. Tubes were centrifuged at 14,000 rpm for 10 min and the top aqueous layer was collected. DNA was precipitated by first adding 1/10th volume 5 M NaCl and mixing, and then adding an equal volume of 2-propanol and inverting the tube until DNA precipitated. Precipitated DNA was removed using a glass hook and washed in 1 mL 70% EtOH. The solution was centrifuged and excess ethanol was removed. The DNA pellet was resuspended in 500 μL TE and 10 μL of RNase A (10 mg/ml) prior to incubation at 37 ºC for 1 h. 350 μL phenol:chloroform:isoamyl alcohol (25:24:1) were added, shaken, and subsequently centrifuged for 10 min at 14,000 rpm. The upper aqueous layer was removed. Extraction was performed using 300 μL chloroform and centrifuged at 14,000 rpm for 5 min. The upper aqueous layer was removed. NaCl (5 M, 1/10 volume) was added and tubes were inverted to mix. An equal volume isopropanol was added and tubes were inverted to mix until DNA precipitation was observed. DNA was removed with a glass hook and washed in 1 mL 70% ethanol. DNA was pelleted and excess ethanol was removed. The pellet was allowed to air dry until residual ethanol evaporated. The pellet was resuspended in an appropriate volume of 10mM TRIS. DNA was then cleaned using PowerClean DNA Clean-Up Kit (MoBio, Carlsbad, CA 92010.) as per the manufacturer's protocol. The sequences of both the WMMB-235 and WMMA-185 genomes have been previously reported and are publically available.[1, 2]

Bacterial Fermentation for Proteomics Analysis of *Micromonospora*/*Rhodococcus* Co-culture

Seed cultures of *Micromonospora* sp. (WMMB-235) and *Rhodococcus* sp. (WMMA-185) were initially grown in 10 mL seed cultures (25 x 150 mm tubes) in ASW-D media (2 g yeast extract, 5 g malt extract, 2 g dextrose per liter of artificial seawater). The *Micromonospora* sp. and *Rhodococcus* sp. seed cultures were grown for 3 and 2 d, respectively. Subsequently, *Micromonospora* sp. (3 mL) and *Rhodococcus* sp. (1 mL) were simultaneously inoculated into 100 mL ASW-D in a 500 mL baffled flask. Monoculture and co-cultures were grown in triplicate.

Protein Extraction and Digestion (for Proteomics)

Following 10 d of fermentation, cultures were centrifuged for 60 min, at 4º C and 3,220 RCF. Cell pellets were suspended in 20 mL of 25 mM Tris-HCl (pH:7.6). Cells were lysed by passing through a French press twice at 1400 kg/cm^3. Supernatants were split into 1.5 mL microcentrifuge tubes and centrifuged for 45 min at 20,817 RCF at 4 ºC. Supernatant of cell lysates were transferred to Amicon Ultra 15 mL Centrifugal Filters with 100,000 MW limit (EMD Millipore) and centrifuged at 3,220 RCF and 5 ºC. Lysates were centrifuged in 5-minute intervals and checked until a final volume of 300 μL was achieved. For precipitation, 1,200 μL ice-cold LC/MS grade acetone was added to the 300 μL lysate and set at –20 ºC overnight.

Following overnight precipitation, samples were centrifuged for 10 min at 4 ºC and 15,000 RCF. The supernatant was discarded and the pellet was washed twice with ice-cold LCMS grade acetone, with centrifugation and discarding of the supernatant each time. Following the final wash, the pellet was dried on ice by opening the cap for exactly 7 min to prevent over drying of the pellet. The pellet was resuspended in 50 mM ammonium bicarbonate (200 µL). 10 µL was removed for protein quantification performed using Bradford Assay. Protein (20 µg) was incubated with 10 mM DTT (1:100) at 37 ºC for 30 min. 55 mM IAA was added (1:20) to this solution and incubated for 45 min at 37 ºC in the dark. Trypsin was added (1:50, trypsin:protein) and incubated overnight at 37 ºC. Samples were dried and resuspended in 0.1% TFA followed by C18 ZipTip (Millipore) sample cleanup according to the manufacturer's protocol.

LC/MS Proteomic Analysis of Micromonospora/Rhodococcus Co-culture

Biological triplicate samples were analyzed in duplicate by nano-LC-MS/MS using a Waters nanoAcquity UPLC (Waters, Milford, MA) coupled to a Q-Exactive Orbitrap mass spectrometer (Thermo Fisher Scientific, MA). Solvents used for chromatographic separation were 0.1% formic acid in (A) water and (B) acetonitrile. For each sample, 5 µL was injected onto a Waters Symmetry C18 180 µm × 20 mm trap column with 5 µm particle size at a flow rate of 5 µL/minute for 5 min at 99% A/1% B. Chromatographic separation was performed on a Waters BEH C18 75 µm × 150 mm analytical column with 1.7 µm particle size and 300 Å pore size using a gradient from 3→35% solvent B at 350 nL/minute over the course of 90 min. At 92 min the gradient increased to 95% B and was held for 10 min. At 102 min, the gradient was returned to 3% B to re-equilibrate the column. A 50 min linear gradient blank was run between samples. Peptides were analyzed by data-dependent MS/MS. A top 15 method was used to acquire data. The instrument settings were as follows. Resolution was set to 70,000 for MS scans and 17,500 for the data-dependent MS/MS scans. The MS AGC target was set to 10^6 counts, while MS/MS AGC target was set to 10^5 counts. The MS scan range was from 300→2000 *m*/*z*. MS scans were recorded in profile mode and MS/MS data was recorded in centroid mode. Dynamic exclusion was set to a repeat count of 1 with a 5 s duration.

Proteomics Data Analysis

Raw LC-MS/MS data was imported into PEAKS Studio (version 7.5) software. The following parameters were used for the PEAKS Studio search; parent mass error tolerance, 25 ppm; fragment mass error tolerance, 0.01 Da; precursor mass search type, monoisotopic; enzyme, trypsin; max missed cleavage, 2; non-specific cleavage, both; fixed modification, carbamidomethylation and variable modification, oxidation. The results were filtered using the following parameters: *de-novo* average local confidence score (ALC) % threshold, 50; protein -10lgP ≥ 20; FDR, 1.0%, and unique peptides ≥ 1.

Chemical Genomic Profiling of Keyicin in *E. coli*

Chemical genomic analysis using the barcoded *E. coli* deletion collection[13] was performed as previously described.[14] The pooled deletion collection was grown in triplicate 200 μL cultures of LB with either 12.5 μg/mL keyicin, 100 μg/mL Ethidium bromide (EtBr), 0.0125% methyl methanesulfonate (MMS), or a 1% DMSO solvent control. Cultures were grown for 24 h at 37 °C. After 24 h, genomic DNA was extracted using the Invitrogen PureLink 96-well genomic DNA extraction kit (Cat # K1821-04A). Strain specific barcodes from each culture were amplified using indexed primers designed for multiplexed Illumina sequencing. Barcodes were amplified by PCR, pooled, gel purified, and quantified by qPCR as previously described.[15] For barcode sequencing, samples were run on an Illumina HiSeq2500 in rapid run mode for 50 cycles at a loading concentration of 15 pM. BEANcounter (https://github.com/csbio) was used to demultiplex and generate a count matrix and chemical genetic score relative to the solvent control for each strain.[16] The average chemical genomic profiles of the 3 replicates were clustered using Cluster 3.0 and visualized in Java Treeview.[17] Profiles were correlated using SpotFire 7.6 (Tibco, USA). To detect gene mutants that significantly decreased fitness in the presence of the compounds employed (keyicin, EtBr, and MMS), we compared normalized counts to a solvent control *via* EdgeR.[18] Significant genes were selected with a cutoff at $P_{adj} < 0.05$. To detect functional enrichment among the top sensitive strain in the presence of keyicin and their interacting partners, we used GeneMANIA.[19]

The chemical genomic profile of keyicin was distinct from EtBr and MMS (Supporting Information, Figure S22**)**, The profiles of EtBr and MMS had a correlation coefficient of 0.47 whereas keyicin, had correlations of only 0.11 and 0.16 with EtBr and MMS, respectively. In assessing the impact of these agents upon DNA we investigated chemical genetic interactions with mutants of *recA*, a key gene involved in DNA damage repair in *E. coli.* This gene shows strong chemical interactions with DNA damaging agents, and as such, mirrors DNA damage processes.[20] As anticipated, *recA* mutants were significantly depleted in the presence of EtBr (fold change 0.19, $p=1.45e^{-17}$) and MMS (fold change 0.01, $p=1.3e^{-56}$) relative to the solvent (DMSO) control (Supporting Information, Table S6). Notably, Δ*recA* was the most sensitive strain to MMS, and the 16th most sensitive to EtBr. Conversely, and consistent with the hypothesis that keyicin does not significantly damage DNA, keyicin had little to no impact on *recA* mutant populations (fold change 0.61, p=0.15). Also notable was that Δ*rusA*, a mutant devoid of a critical nuclease involved in DNA repair, was the 7th most sensitive strain to EtBr yet was impervious to the effects of keyicin. Importantly, among the 20 most sensitive mutants to keyicin, not a single one bore mutations in DNA replication or repair machineries.

Chemical genomics revealed a total of 46 gene mutants with significant sensitivities to keyicin (Supporting Information, Table S7). We found no significant functional enrichment among these genes to help understand its mode of action. However, when we looked at the network around these genes (including known genetic and physical interactors, genes with shared protein domain, and genes with known co-expression), we found enrichment for fatty acid binding (FDR $1.17e^{-3}$), driven by *gcvH* which has a shared protein domain with the products of *aceF* and *sucB*.[21-

[23] Furthermore, the Δ*fadR* mutant was the 10th most sensitive strain to keyicin exposure. That *fadR*, encodes a regulator of fatty acid metabolism,[24-26] in tandem with findings related to *gcvH* and others, suggests that further studies into keyicin's impact on bacterial lipid metabolism are clearly warranted and likely to shed light on this novel anthracycline's mechanism of antibacterial action.

Amplified ^{13}C Incorporation During Keyicin Biosynthesis

Incorporation of isotopically labeled U-^{13}C glucose was necessary to ultimately carry out 2D ^{13}C–^{13}C experiments on keyicin. This also was the case in order to visualize all ^{13}C resonances in a 1D spectrum. Simple substitution of U-^{13}C glucose for glucose in ASW-A media yielded ^{13}C–^{13}C COSY data with correlations between each aromatic carbon and only one neighboring carbon atom. The lack of a carbon-carbon spin system in the ^{13}C–^{13}C COSY data indicated either the presence of heteroatoms or insufficient ^{13}C incorporation into **1**. Based on the aforementioned justification for a polycyclic aromatic core, it was apparent that the lack of detectable carbon–carbon connectivity could be attributed to insufficient isotope incorporation. Consequently, ^{13}C incorporation was optimized on the basis of a media study looking at keyicin generation in seven isotopically enriched media (Supporting Information, Table S2). The efficiency of ^{13}C incorporation was evaluated on the basis of both mass shifts and isotopic distributions as determined using HRMS (Supporting Information, Figure S5). Notably, a primary component of ASW-D media, malt extract, was found to compete with U-^{13}C glucose as a carbon source thereby decreasing ^{13}C incorporation efficiencies. Through the process of trial-and-error, we found that the use of peptone instead of malt extract led to retained keyicin titers while, at the same time, enabling significantly improved U-^{13}C glucose incorporation.

References:

1. Adnani, N.; Braun, D. R.; McDonald, B. R.; Chevrette, M. G.; Currie, C. R.; Bugni, T. S., Draft Genome Sequence of Micromonospora sp. Strain WMMB235, a Marine Ascidian-Associated Bacterium. *Genome Announc* **2017,** *5* (2).
2. Adnani, N.; Braun, D. R.; McDonald, B. R.; Chevrette, M. G.; Currie, C. R.; Bugni, T. S., Complete Genome Sequence of Rhodococcus sp. Strain WMMA185, a Marine Sponge-Associated Bacterium. *Genome Announc* **2016,** *4* (6).
3. Wyche, T. P.; Hou, Y.; Braun, D.; Cohen, H. C.; Xiong, M. P.; Bugni, T. S., First natural analogs of the cytotoxic thiodepsipeptide thiocoraline A from a marine Verrucosispora sp. *The Journal of organic chemistry* **2011,** *76* (16), 6542-7.
4. Adnani, N.; Vazquez-Rivera, E.; Adibhatla, S. N.; Ellis, G. A.; Braun, D. R.; Bugni, T. S., Investigation of Interspecies Interactions within Marine Micromonosporaceae Using an Improved Co-Culture Approach. *Marine drugs* **2015,** *13* (10), 6082-6098.
5. Gassner, N. C.; Tamble, C. M.; Bock, J. E.; Cotton, N.; White, K. N.; Tenney, K.; St Onge, R. P.; Proctor, M. J.; Giaever, G.; Nislow, C.; Davis, R. W.; Crews, P.; Holman, T. R.; Lokey, R. S., Accelerating the discovery of biologically active small molecules using a high-throughput yeast halo assay. *J Nat Prod* **2007,** *70* (3), 383-90.

6. Adnani, N.; Vazquez-Rivera, E.; Adibhatla, S. N.; Ellis, G. A.; Braun, D. R.; Bugni, T. S., Investigation of Interspecies Interactions within Marine Micromonosporaceae Using an Improved Co-Culture Approach. *Mar Drugs* **2015,** *13* (10), 6082-98.
7. Tenover, F. C.; Moellering, R. C., Jr., The rationale for revising the Clinical and Laboratory Standards Institute vancomycin minimal inhibitory concentration interpretive criteria for Staphylococcus aureus. *Clinical infectious diseases : an official publication of the Infectious Diseases Society of America* **2007,** *44* (9), 1208-15.
8. Kawai, H.; Hayakawa, Y.; Nakagawa, M.; Furihata, K.; Seto, H.; Otake, N., Arugomycin, A new anthracycline antibiotic II. Structural elucidation. *J. Antibiot.* **1986**, *40*, 1273–1282.
9. Shimosaka, A.; Kawai, H.; Hayakawa, Y.; Komeshima, N.; Nakagawa, M.; Seto, H.; Otake, N., Arugomycin, A new anthracycline antibiotic III. Biological activities of arugomycin and its analogues obtained by chemical degradation and modification. *J. Antibiot.* **1986**, *40*, 1283–1291.
10. Oki, T.; Kitamura, I.; Matsuzawa, Y.; Shibamoto, N.; Ogasawara, T.; Yoshimoto, A.; Inui, T.; Naganawa, H.; Takeuchi, T.; Umezawa, H., Antitumor anthracycline antibiotics, aclacinomycin A and analogues. II. Structural determination. *J. Antibiot.* **1979**, *32* (8) , 801–819.
11. Shao, Y.; Molnar, L. F.; Jung, Y.; Kussmann, J.; Ochsenfeld, C.; Brown, S. T.; Gilbert, A. T.; Slipchenko, L. V.; Levchenko, S. V.; O'Neill, D. P.; DiStasio, R. A., Jr.; Lochan, R. C.; Wang, T.; Beran, G. J.; Besley, N. A.; Herbert, J. M.; Lin, C. Y.; Van Voorhis, T.; Chien, S. H.; Sodt, A.; Steele, R. P.; Rassolov, V. A.; Maslen, P. E.; Korambath, P. P.; Adamson, R. D.; Austin, B.; Baker, J.; Byrd, E. F.; Dachsel, H.; Doerksen, R. J.; Dreuw, A.; Dunietz, B. D.; Dutoi, A. D.; Furlani, T. R.; Gwaltney, S. R.; Heyden, A.; Hirata, S.; Hsu, C. P.; Kedziora, G.; Khalliulin, R. Z.; Klunzinger, P.; Lee, A. M.; Lee, M. S.; Liang, W.; Lotan, I.; Nair, N.; Peters, B.; Proynov, E. I.; Pieniazek, P. A.; Rhee, Y. M.; Ritchie, J.; Rosta, E.; Sherrill, C. D.; Simmonett, A. C.; Subotnik, J. E.; Woodcock, H. L., 3rd; Zhang, W.; Bell, A. T.; Chakraborty, A. K.; Chipman, D. M.; Keil, F. J.; Warshel, A.; Hehre, W. J.; Schaefer, H. F., 3rd; Kong, J.; Krylov, A. I.; Gill, P. M.; Head-Gordon, M., Advances in methods and algorithms in a modern quantum chemistry program package. *Phys Chem Chem Phys* **2006,** *8* (27), 3172-91.
12. Smith, S. G.; Goodman, J. M., Assigning stereochemistry to single diastereoisomers by GIAO NMR calculation: the DP4 probability. *J Am Chem Soc* **2010,** *132* (37), 12946-59.
13. Otsuka, Y.; Muto, A.; Takeuchi, R.; Okada, C.; Ishikawa, M.; Nakamura, K.; Yamamoto, N.; Dose, H.; Nakahigashi, K.; Tanishima, S.; Suharnan, S.; Nomura, W.; Nakayashiki, T.; Aref, W. G.; Bochner, B. R.; Conway, T.; Gribskov, M.; Kihara, D.; Rudd, K. E.; Tohsato, Y.; Wanner, B. L.; Mori, H., GenoBase: comprehensive resource database of Escherichia coli K-12. *Nucleic Acids Res* **2015,** *43* (Database issue), D606-17.
14. Davison, J. R.; Lohith, K. M.; Wang, X.; Bobyk, K.; Mandadapu, S. R.; Lee, S. L.; Cencic, R.; Nelson, J.; Simpkins, S.; Frank, K. M.; Pelletier, J.; Myers, C. L.; Piotrowski, J.; Smith, H. E.; Bewley, C. A., A New Natural Product Analog of Blasticidin S Reveals Cellular Uptake Facilitated by the NorA Multidrug Transporter. *Antimicrobial agents and chemotherapy* **2017,** *61* (6).
15. Piotrowski, J. S.; Simpkins, S. W.; Li, S. C.; Deshpande, R.; McIlwain, S. J.; Ong, I. M.; Myers, C. L.; Boone, C.; Andersen, R. J., Chemical genomic profiling via barcode sequencing to predict compound mode of action. *Methods in molecular biology (Clifton, N.J.)* **2015,** *1263*, 299-318.
16. Simpkins, S. W.; Nelson, J.; Deshpande, R.; Li, S. C.; Piotrowski, J. S.; Wilson, E. H.; Gebre, A. A.; Okamoto, R.; Ohya, Y.; Osada, H.; Yoshida, M.; Boone, C.; Myers, C. L., Large-scale

interpretation of chemical-genetic interaction profiles using a genetic interaction network. *bioRxiv* **2017**.
17. Saldanha, A. J., Java Treeview--extensible visualization of microarray data. *Bioinformatics (Oxford, England)* **2004,** *20* (17), 3246-8.
18. Robinson, M. D.; McCarthy, D. J.; Smyth, G. K., edgeR: a Bioconductor package for differential expression analysis of digital gene expression data. *Bioinformatics (Oxford, England)* **2010,** *26* (1), 139-40.
19. Warde-Farley, D.; Donaldson, S. L.; Comes, O.; Zuberi, K.; Badrawi, R.; Chao, P.; Franz, M.; Grouios, C.; Kazi, F.; Lopes, C. T.; Maitland, A.; Mostafavi, S.; Montojo, J.; Shao, Q.; Wright, G.; Bader, G. D.; Morris, Q., The GeneMANIA prediction server: biological network integration for gene prioritization and predicting gene function. *Nucleic Acids Res* **2010,** *38* (Web Server issue), W214-20.
20. Bellou, S.; Muenter, M.; Travers, M.; Leifer, B.; Baig, S.; Kramer, C.; Qi, M.; Joshi, C.; Carlson, A.; Conway, C., Determination of Escherichia coli Genes Involved in Resistance to DNA Alkylating Agents. *The FASEB Journal* **2016,** *30* (1 Supplement), 789.3-789.3.
21. Okamura-Ikeda, K.; Ohmura, Y.; Fujiwara, K.; Motokawa, Y., Cloning and nucleotide sequence of the gcv operon encoding the Escherichia coli glycine-cleavage system. *Eur J Biochem* **1993,** *216* (2), 539-48.
22. Christensen, Q. H.; Martin, N.; Mansilla, M. C.; de Mendoza, D.; Cronan, J. E., A novel amidotransferase required for lipoic acid cofactor assembly in Bacillus subtilis. *Mol Microbiol* **2011,** *80* (2), 350-63.
23. Spencer, M. E.; Guest, J. R., Transcription analysis of the sucAB, aceEF and lpd genes of Escherichia coli. *Molecular & General Genetics : MGG* **1985,** *200* (1), 145-54.
24. Zhang, Y.; Gao, R.; Ye, H.; Wang, Q.; Feng, Y., A new glimpse of FadR-DNA crosstalk revealed by deep dissection of the E. coli FadR regulatory protein. *Protein & cell* **2014,** *5* (12), 928-39.
25. My, L.; Ghandour Achkar, N.; Viala, J. P.; Bouveret, E., Reassessment of the Genetic Regulation of Fatty Acid Synthesis in Escherichia coli: Global Positive Control by the Dual Functional Regulator FadR. *J Bacteriol* **2015,** *197* (11), 1862-72.
26. Bacik, J. P.; Yeager, C. M.; Twary, S. N.; Marti-Arbona, R., Modulation of FadR binding capacity for acyl-CoA fatty acids through structure-guided mutagenesis. *The Protein Journal* **2015,** *34* (5), 359-66.

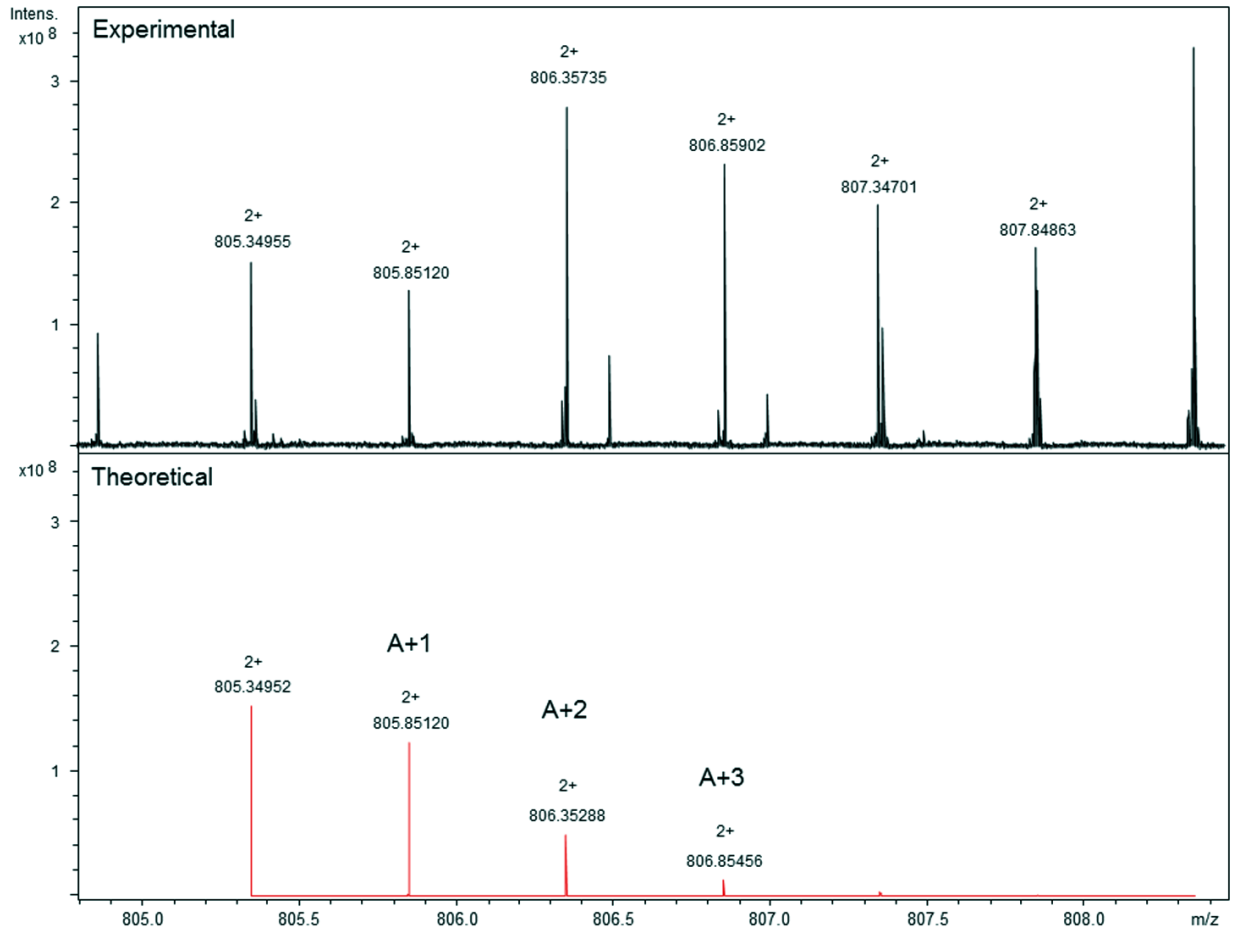


Figure S1. Ultra-high resolution FT-ICR mass spectrum for the $[M+2H]^{2+}$ ion of $C_{75}H_{108}N_4O_{34}$ at a resolving power of 2,000,000. The top spectrum is the experimental data, shown in black, and the bottom spectrum is the theoretical spectrum, shown in red, of $[M+2H]^{2+} = C_{75}H_{108}N_4O_{34}$. Isotopic clusters are labelled as A+1, A+2 and A+3.

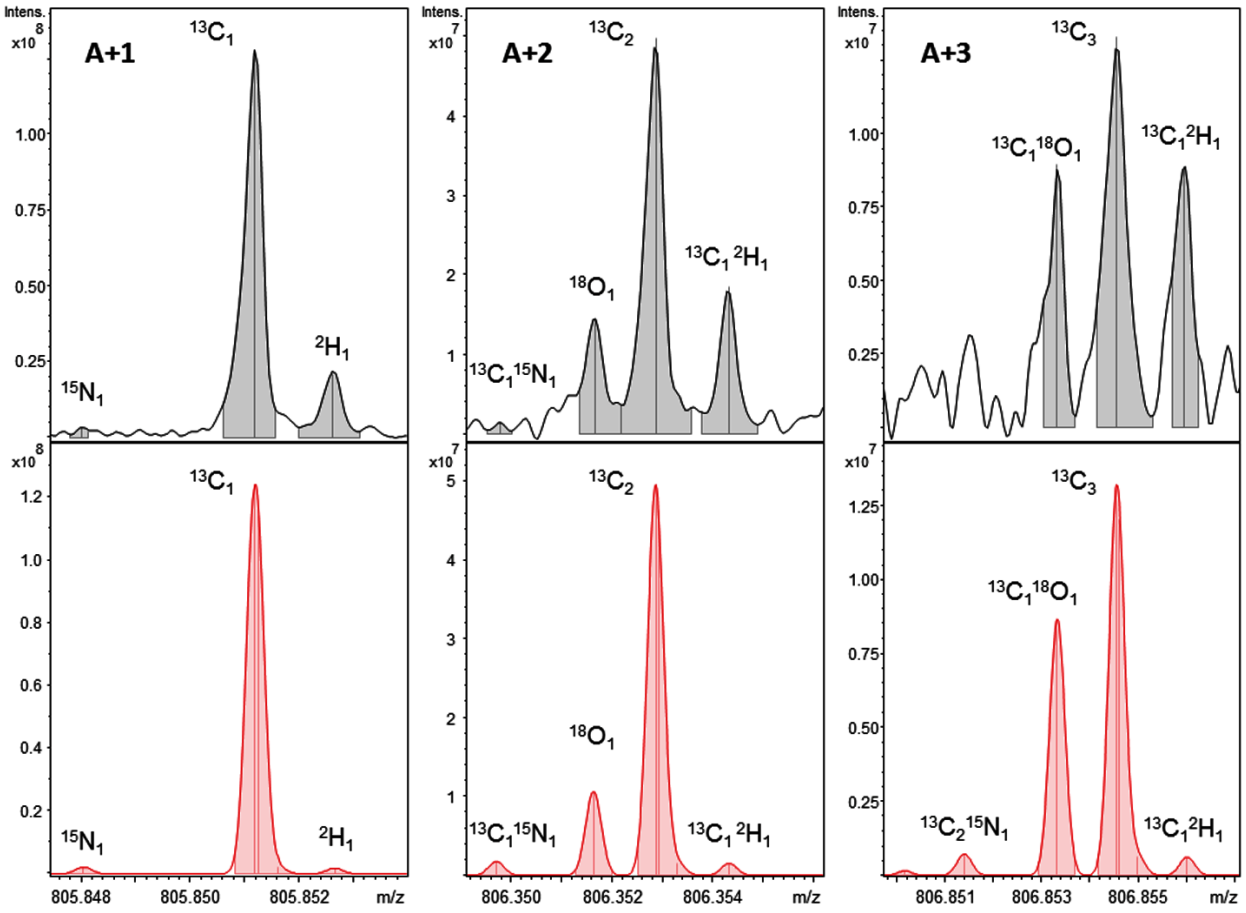


Figure S2: Isotopic fine structure observed in the A+1, A+2 and A+3 peaks confirm the molecular formula of Keyicin. For each isotopologue of $C_{75}H_{108}N_4O_{34,}$ the peaks are labelled with the contributing isotope. The observed discrepancy in the ^{2}H peaks is due to deuteration of the sample for NMR measurements. The top spectrum is the experimental data (black) and the bottom spectrum the theoretical spectrum (red) of $[M+2H]^{2+}$ = $C_{75}H_{108}N_4O_{34}$ at a resolving power of 2,000,000.

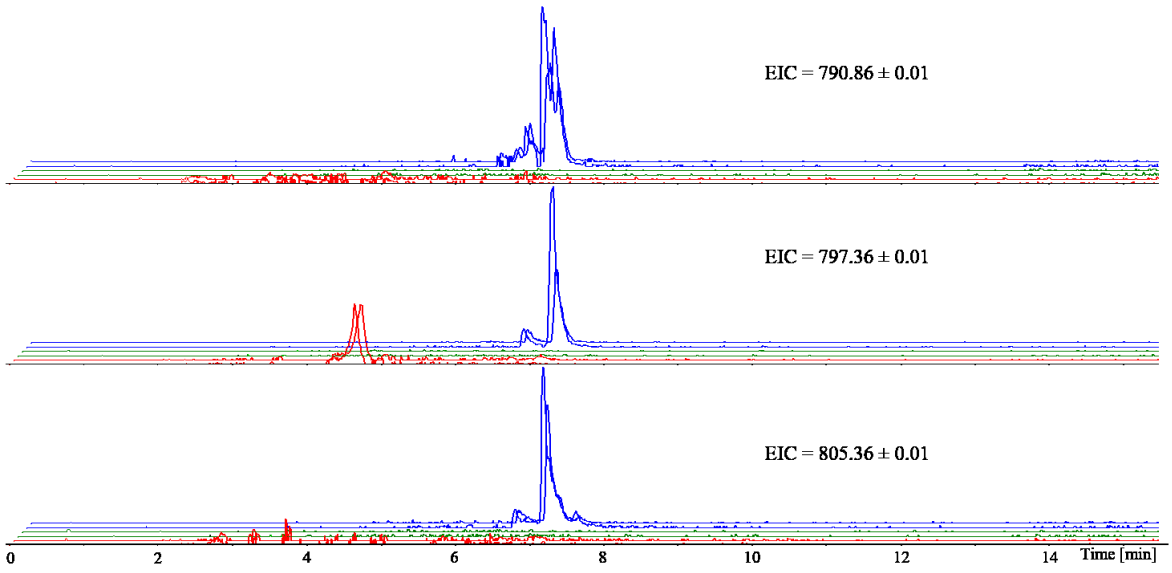


Figure S3. Extracted ion chromatograms of crude LCMS spectra for WMMB-235 (*Micromonospora* sp.) monoculture (red), WMMA-185 (*Rhodococcus* sp.) monoculture (green), and WMMB-235/ WMMA-185 co-culture (blue).

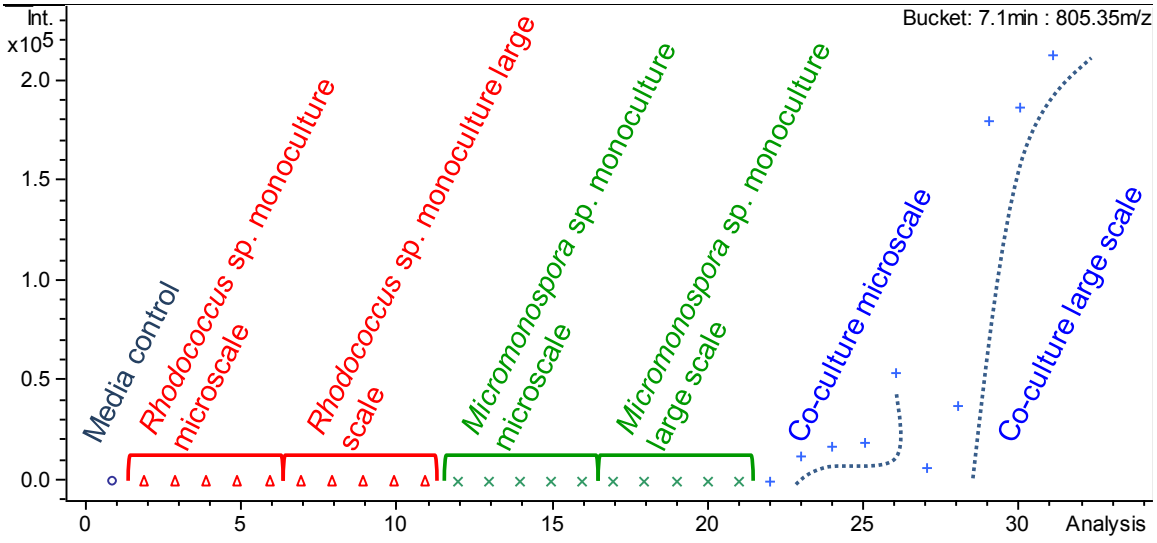


Figure S4. Dynamics of keyicin (**1**) production between microscale (500 µL) and standard scale (100 mL) culture. Within each labeled group, symbols from left to right correspond to aliquots removed after 5, 7, 9, 11 and 13 days. The intensity of keyicin in each sample is plotted along the y-axis

Table S1. Keyicin ^{1}H and ^{13}C NMR data (600 MHz for ^{1}H, 125 MHz for ^{13}C, CD_3OD)

Position	δ_C,[b] mult.	δ_H[a] (*J* in Hz)	COSY	HMBC[a]	ROESY
1	149.2, C				
2	141.2, C				
3	123.9, CH	7.38, s		1, 4a, 4, 5’	
4	157.7, C				
4a	115.9, C				
5	192.6, C				
5a	115.5, C				
6	163.1, C				
6a	132.2, C				
7	72.8, CH	5.04, br s	8		
8	40.0, CH_2	2.64, dd (overlap)	7		
		2.03, dd (overlap)			
9	70.3, C				
10	59.4, CH	3.90, s			
10a	144.8, C				
11	120.8, C				
11a	135.1, C				
12	181.0, C				
12a	118.1, C				
13	30.2, CH_3	1.59, s			
COO	172.9, C				
OCH_3	53.0, CH_3	3.64, s		COOH	
1’	98.8, CH	5.84, br s	2’		
2’	70.1, CH	4.29, d (10.8)	1’		NCH_3
3’	62.7, CH	3.66, dd, (overlap)			
4’	82.5, CH	4.17, br s			
5’	78.2, C				
6’	24.2, CH_3	1.65, d (5.5)		2, 4’, 5’	
NCH_3	44.6, CH_3	2.56, s			S1-1

Table S1 cont. Summary of ^{1}H and ^{13}C NMR data for **1** (600 MHz for ^{1}H, 125 MHz for ^{13}C, CD_3OD)

Position	δ_C,[b] mult.	δ_H[a] (*J* in Hz)	COSY	HMBC	ROESY
S1					3, 4, 6
1	101.1, CH	5.32, dd (overlap)	2		
2	34.8, CH_2	2.01, m	1	3	
		1.91, m			
3	66.3, CH	4.09, m			
4	82.8, CH	3.83, dd (overlap)		2, 3	
5	68.8, CH	4.52, m			
6	17.3, CH_3	1.21, d (overlap)		5	1, 4
S2					
1	101.1, CH	5.64, d (9.7)	2	S1-4	4, 5
2	43.4, CH_2	2.05, m	1		
		1.79, m			
3	102.6, C				
4	89.0, CH	3.81, dd (overlap)		5, 3, CH_3	
5	73.7, CH	4.91, m			CH_3
6	19.8, CH_3	0.72, d (9.4)		4	4
CH_3	19.6, CH_3	1.50, d (6.1)		4, 5	4, 5
S3					
1	102.9, CH	4.92, dd (overlap)	2	S2-4, 3	S2-4
2	33.8, CH_2	1.91, m	1, 3		
		1.71, m		3, 4	
3	66.7, CH	3.59, m	2	4	
4	72.2, CH	3.47, dd (overlap)		3	
5	68.7, CH	3.5, m		4	
6	17.2, CH_3	1.15, d (overlap)		4, 5	
S4					
1	101.9, CH	5.5, br s	2		6, NCH_3
2	30.1, CH_2	2.13, m			
		2.04, m	1, 3		
3	63.9, CH	2.71, m	4		
4	75.5, CH	4.05, dd (overlap)	2, 3		S5-1, NCH_3
5	69.9, CH	4.11, m			
6	18.5, CH_3	1.34, d (overlap)		4, 5	4, S5-1
NCH_3	44.6, CH_3	2.56, s			

Table S1 cont. Summary of ^{1}H and ^{13}C NMR data for **1** (600 MHz for ^{1}H, 125 MHz for ^{13}C, CD_3OD)

Position	δ_C,[b] mult.	δ_H[a] (*J* in Hz)	COSY	HMBC	ROESY
S5					S4-4, S4-6
1	101.1, CH	5.15, d (11.6)	2		
2	35.2, CH_2	2.01, m		3	
		1.91, m	1		
3	66.3, CH	4.09, m			
4	82.9, CH	3.93, d (8.6)		2, 3	1
5	68.6, CH	4.40, m			
6	17.4, CH_3	1.19, d (overlap)		5	S6-1
S6					
1	101.1, CH	5.31, dd (overlap)	2	S5-4	6
2	42.6, CH_2	2.60, dd (overlap		3, 4	
		2.03, dd (overlap)	1		
3	90.3, C				
4	84.9, CH	3.49, dd (overlap)	5		6, S7-1, CH_3
5	71.8, CH	4.07, m	4, 6	4	
6	19.0, CH_3	1.33, d (overlap)	5		S7-1, CH_3
CH_3	25.5, CH_3	1.75, s		2, 3, 4	4, 6
S7					
1	103.1, CH	5.01, dd (?)	2	S6-4, 3	S6-4
2	33.8, CH_2	1.95, m	1		
		1.74, m	3		
3	66.7, CH	3.75, dd	2		5
4	72.3, CH	3.54, dd		2, 3, 4	6
5	69.1, CH	3.96, m	6		3
6	17.1, CH_3	1.23, d (overlap)	5	4, 5	4

[a]HMBC correlations are from proton(s) to the indicated carbon.

Table S2. U-^{13}C glucose media study for keyicin production.

Medium	Yeast Extract (g/L)	Malt Extract (g/L)	U- ^{13}C glucose (g/L)	Peptone (g/L)	$CaCO_3$ (g/L)	Starch (g/L)
1	2	5	2	0	0	0
2	2	2.5	4	0	0	0
3	2	0	4	2.5	0	0
4	2	0	2	5	0	0
5	2	2.5	2	2.5	0	0
6	5	0	10	5	5	5
7	5	0	20	5	5	0

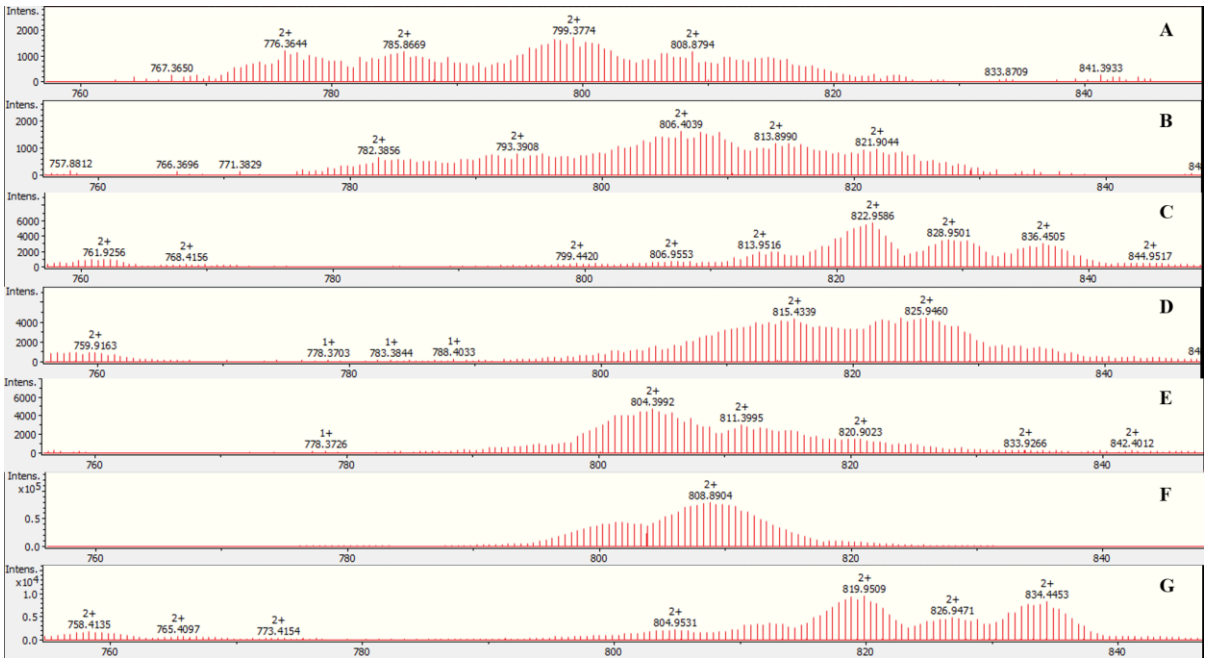


Figure S5. WMMB235 and WMMA185 co-culture was grown under seven different media conditions containing U-^{13}C glucose. Extracts were subjected to LC/MS analysis to evaluate the incorporation of ^{13}C into keyicin. (A) media 1 (ASW-D) (**Table S2**); (B) media 2 (**Table S2**); (C) media 3 (**Table S2**); (D) media 4 (**Table S2**); (E) media 5 (**Table S2**); (F) media 6 (**Table S2**); (G) media 7 (**Table S2**).

Figure S6. ^{1}H NMR (600 MHz, CD_3OD) of keyicin

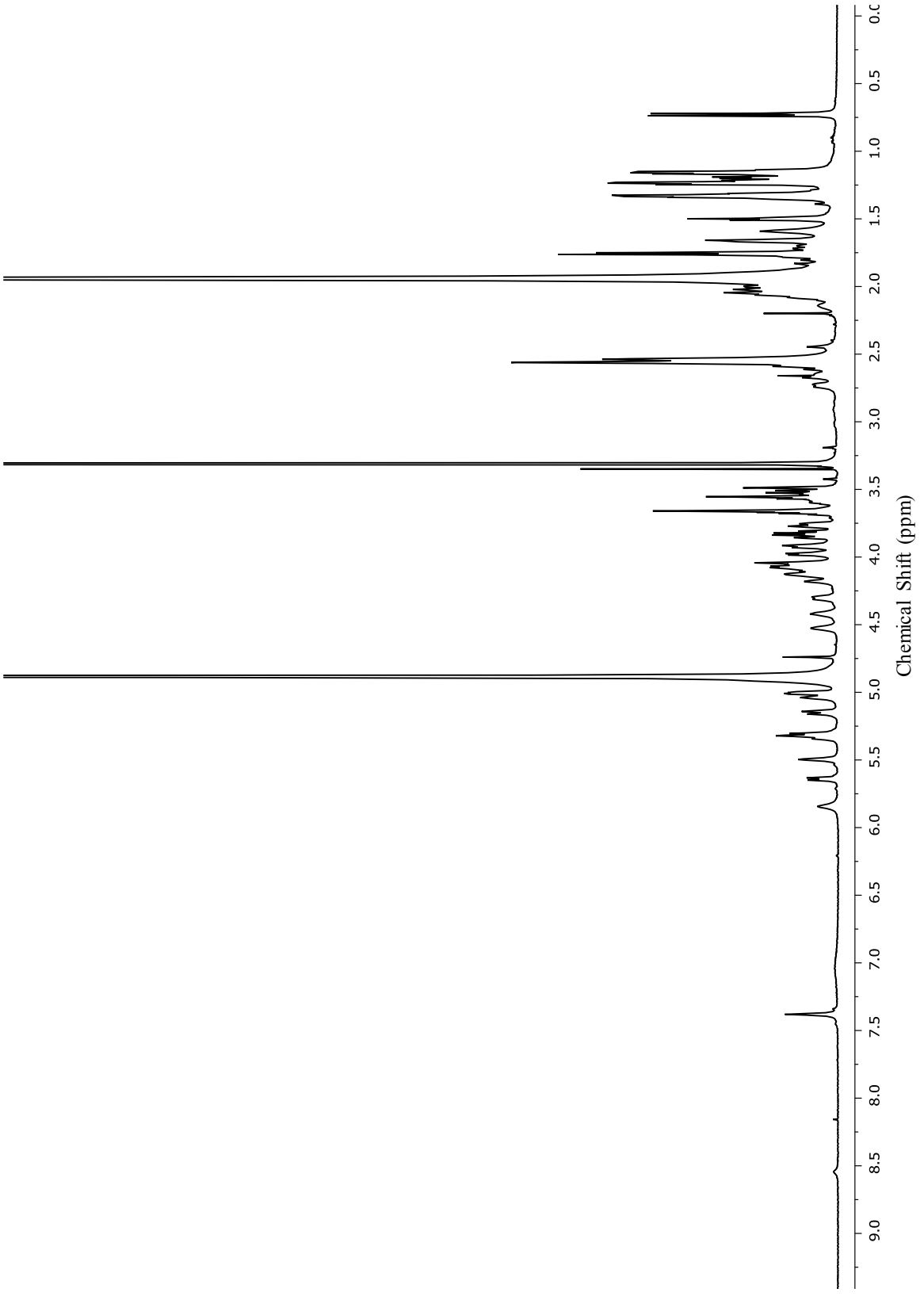


Figure S7. ^{13}C NMR (125 MHz, CD_3OD) of keyicin

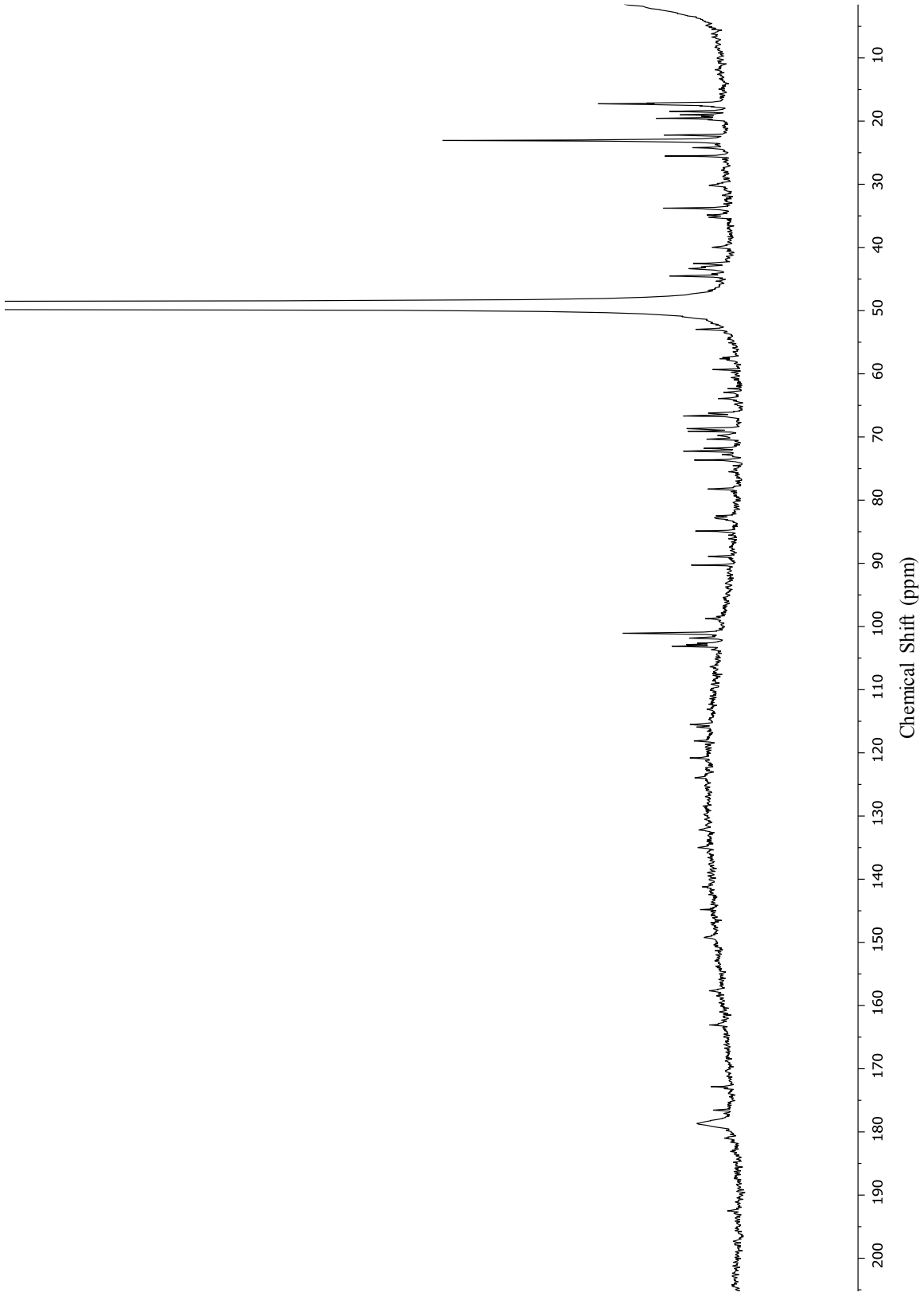


Figure S8. 2D COSY NMR (600 MHz, CD_3OD) of keyicin

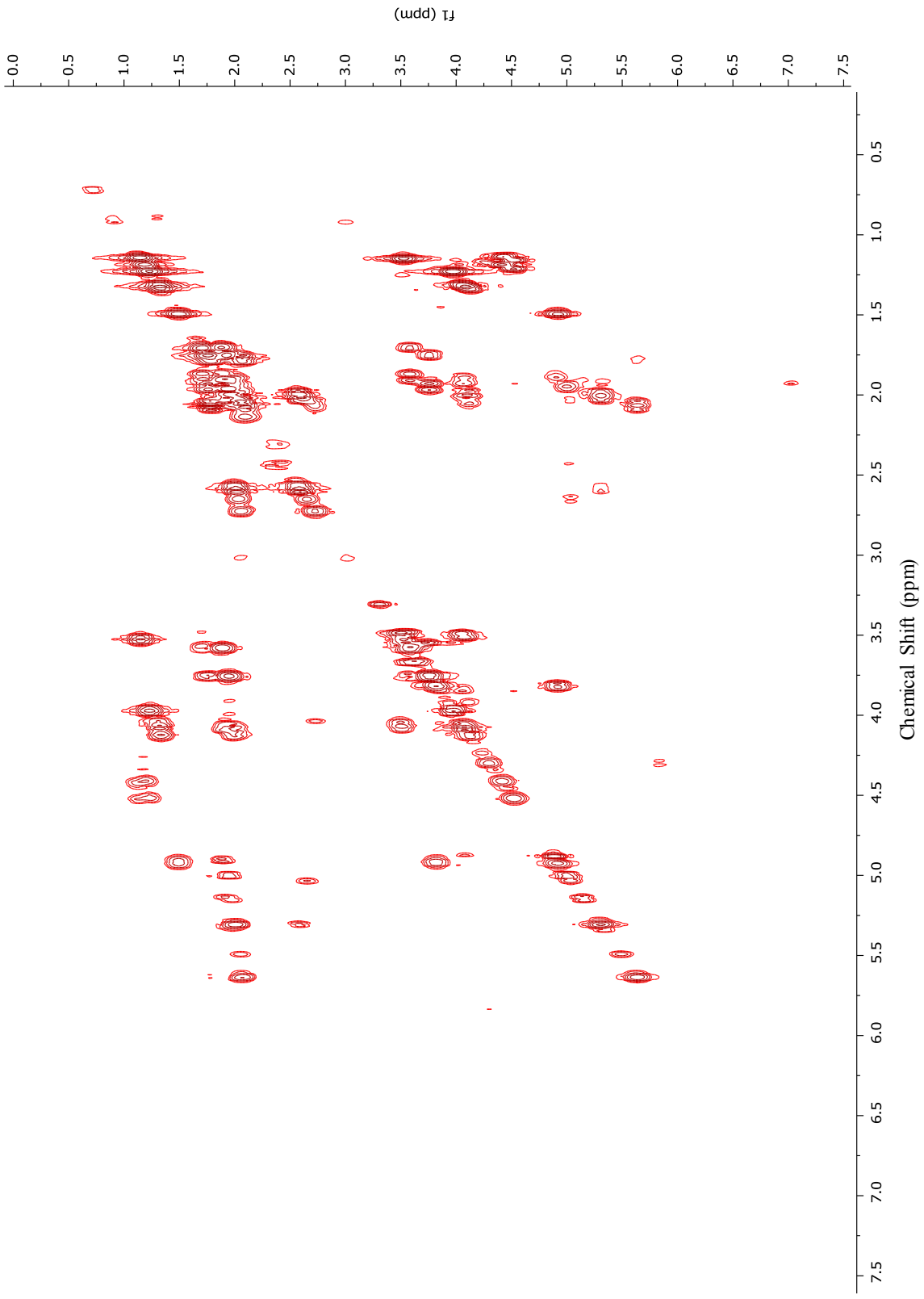


Figure S9. 2D HSQC NMR (600 MHz, CD_3OD) of keyicin

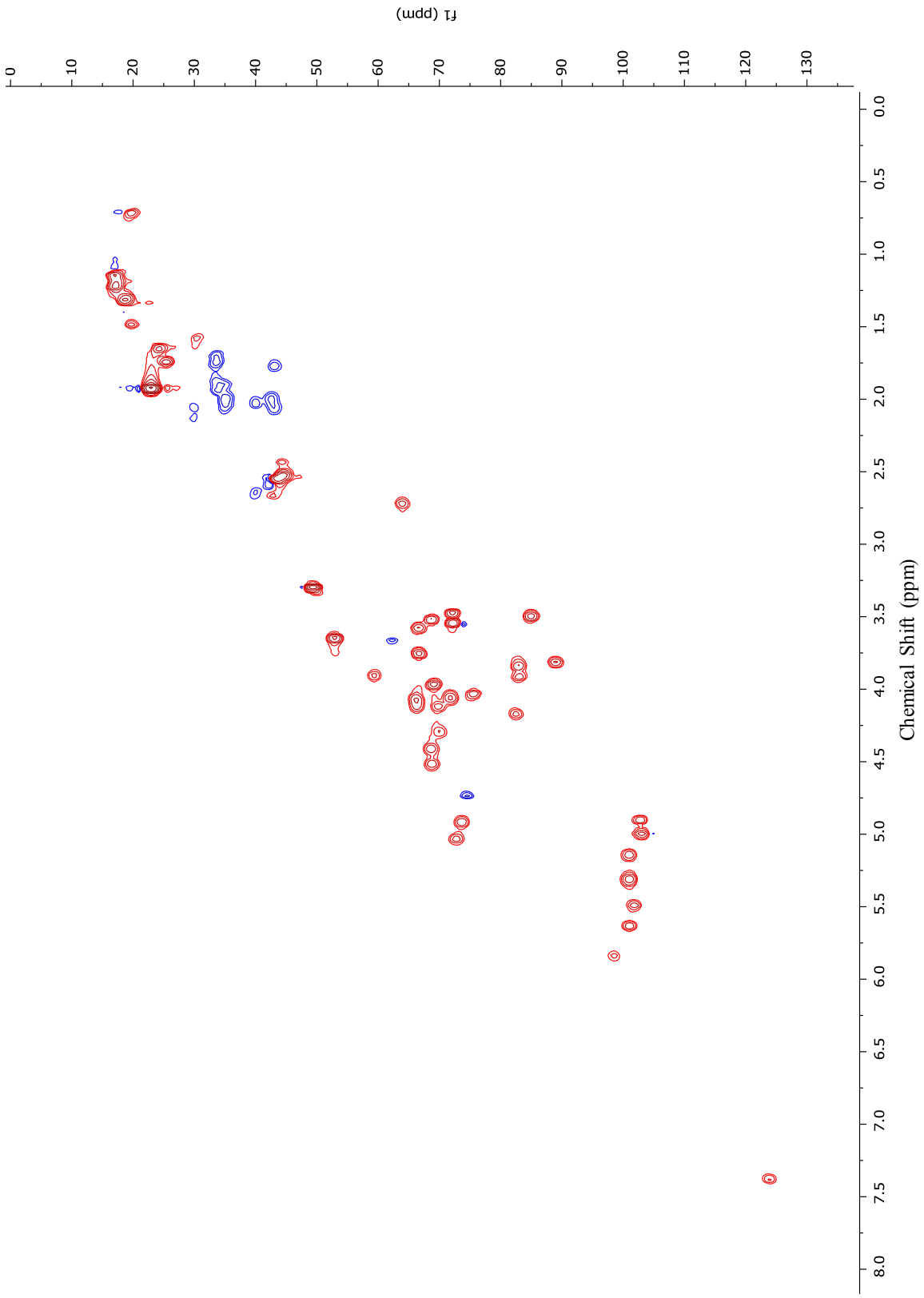


Figure S10. 2D HMBC NMR (600 MHz, CD_3OD) of keyicin

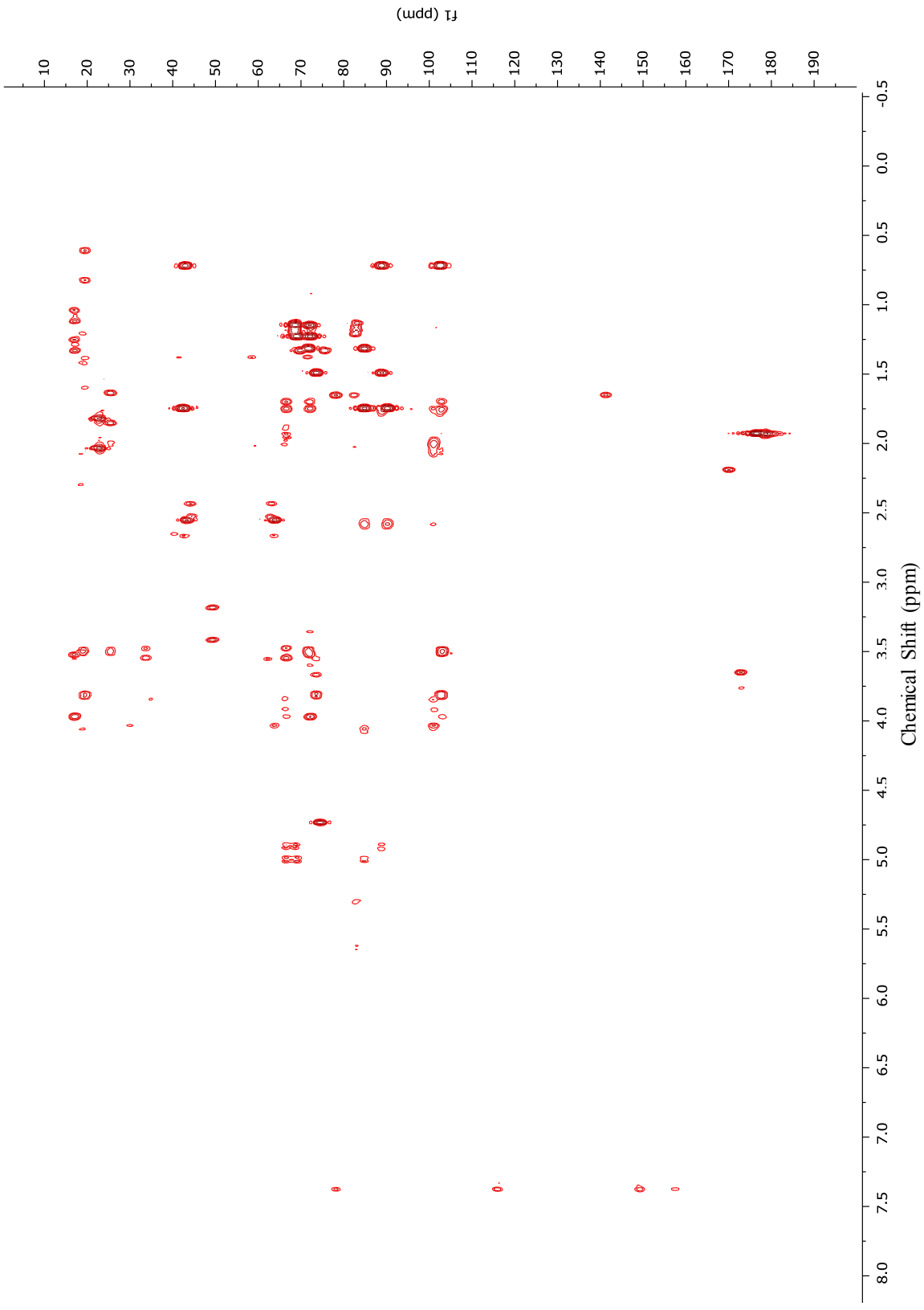


Figure S11. 2D ROESY NMR (600 MHz, CD_3OD) of keyicin

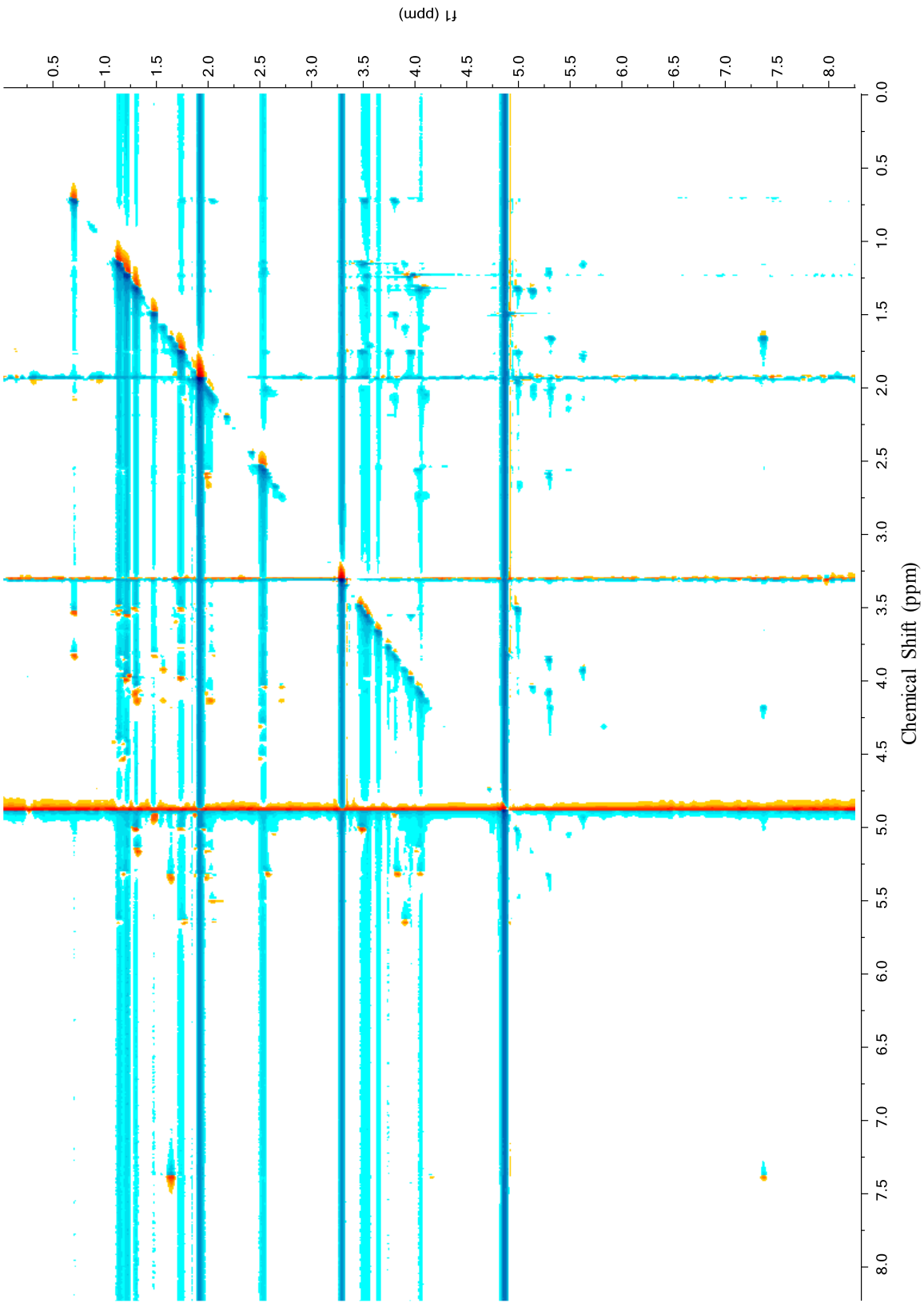


Figure S12. ^{13}C-^{13}C COSY NMR (125 MHz, CD_3OD) of ^{13}C-labeled keyicin

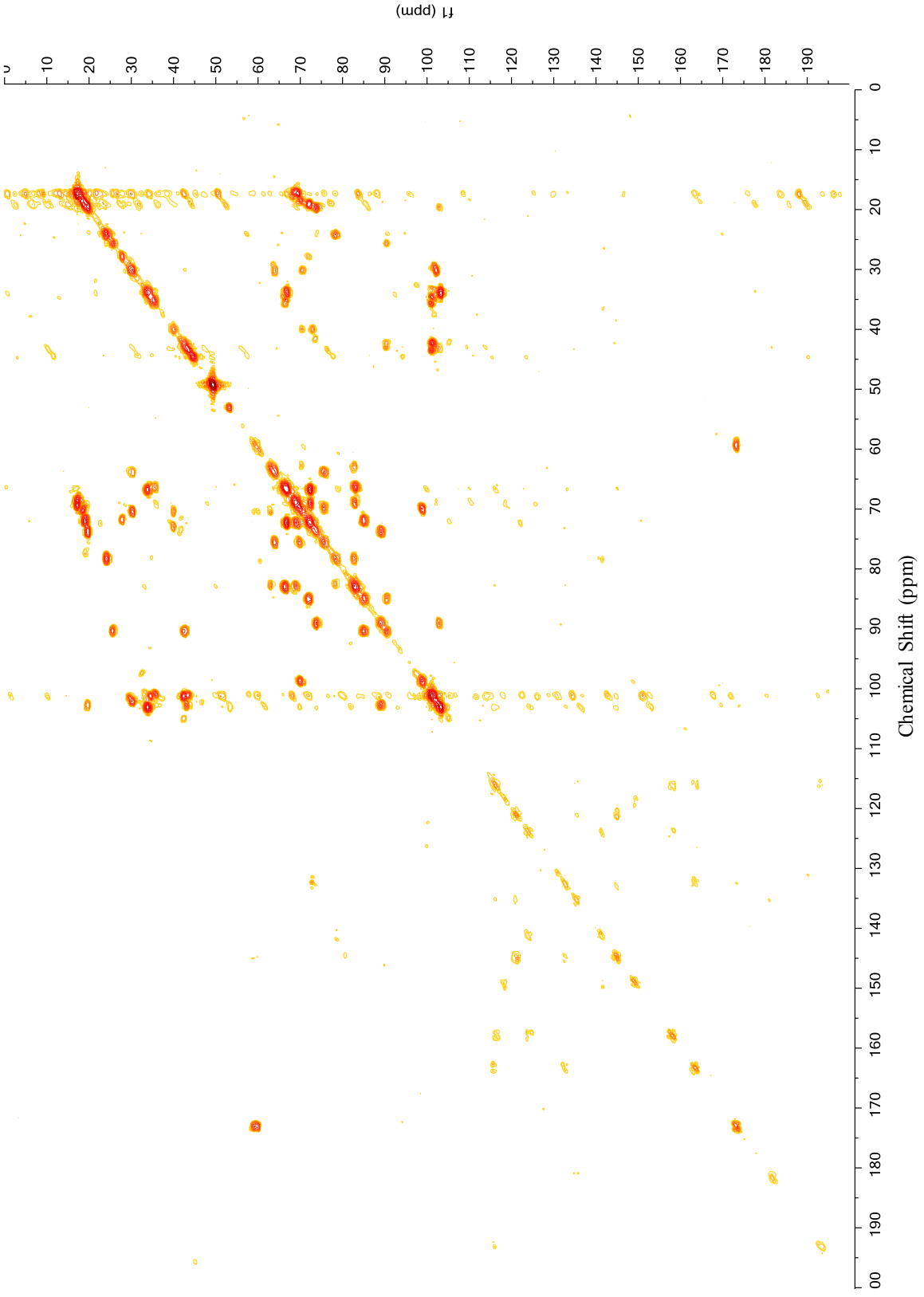
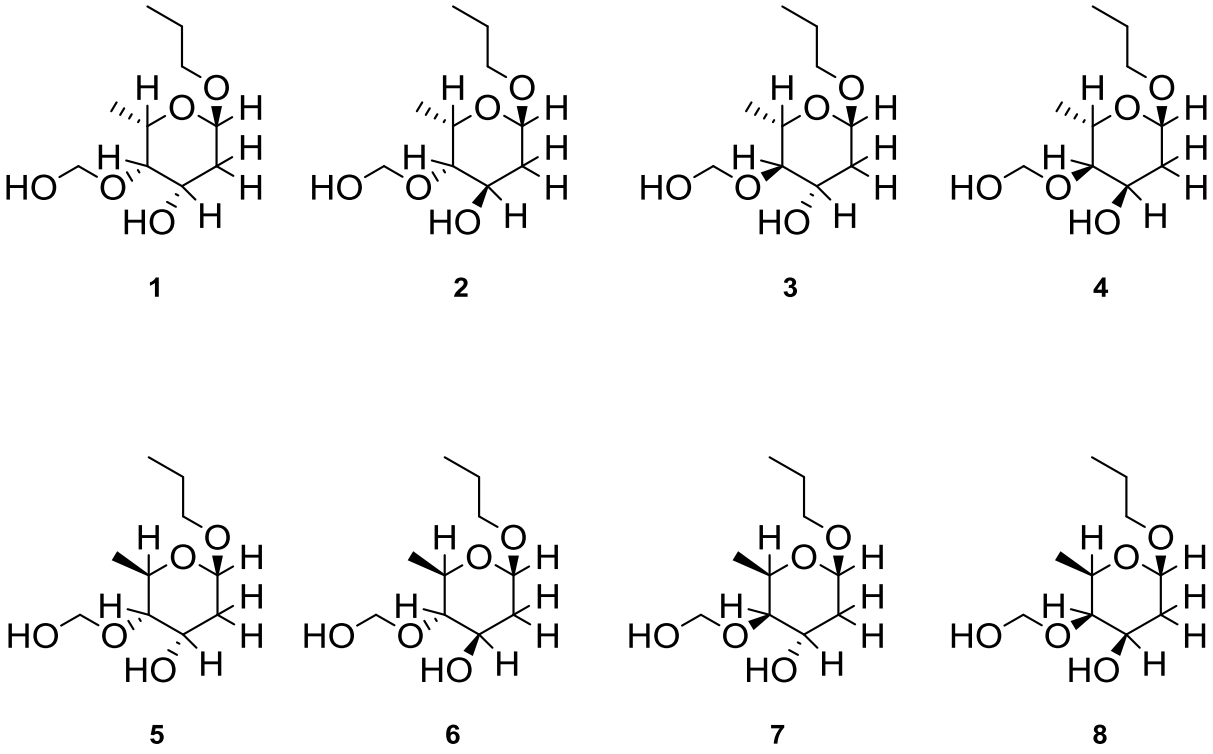
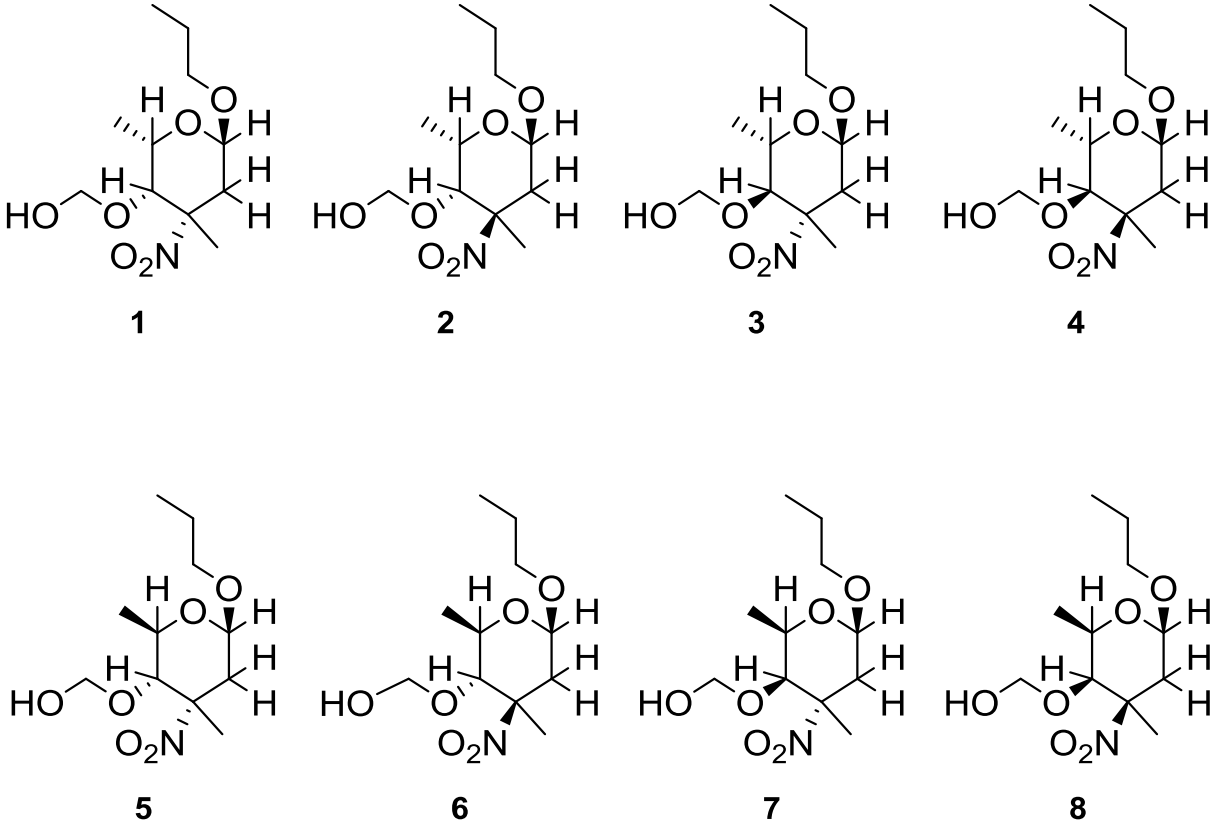


Figure S13. Characterization of sugar S1 using molecular modeling and DFT calculations



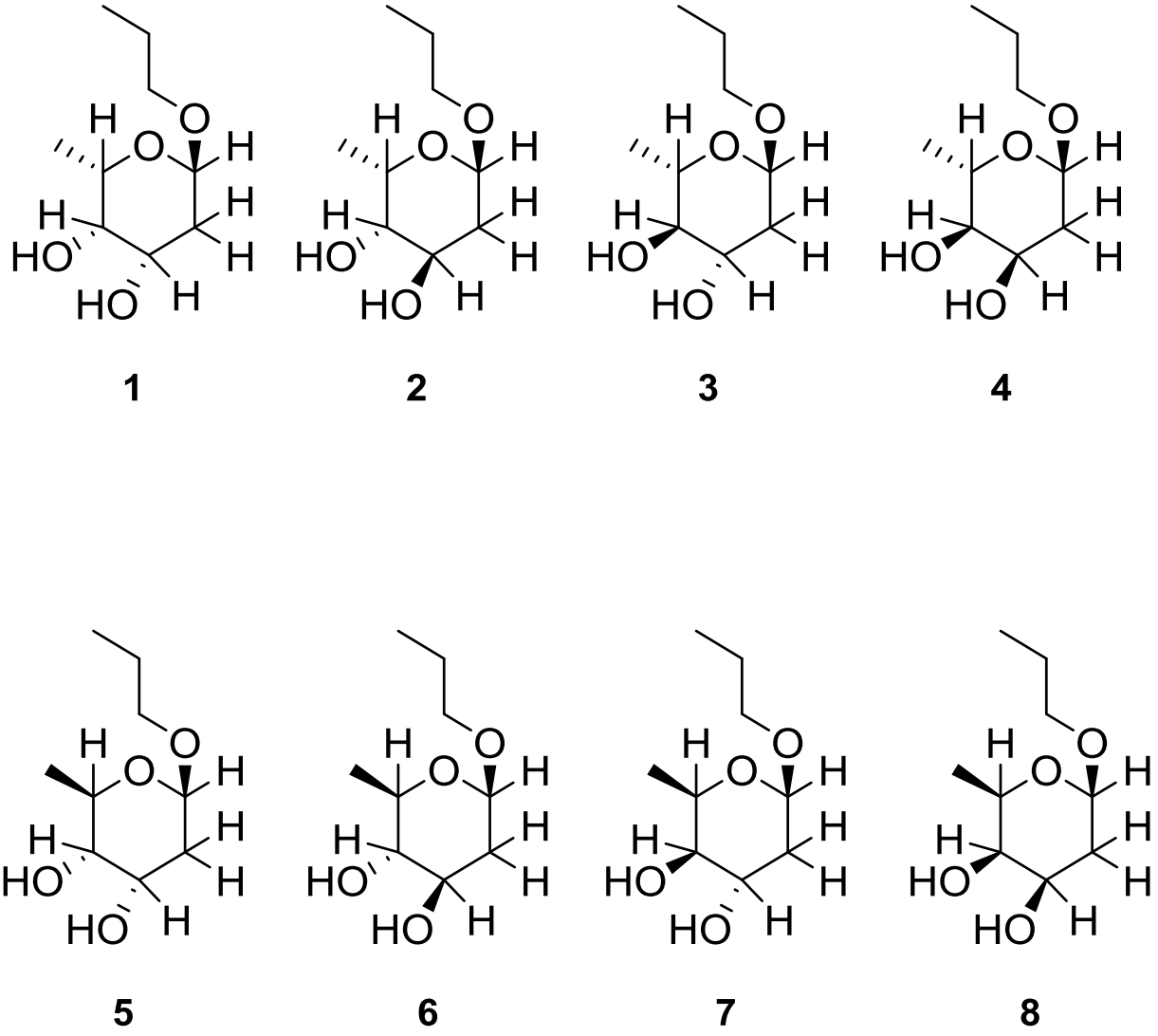
	1	Δ	2	Δ	3	Δ	4	Δ	5	Δ	6	Δ	7	Δ	8	Δ	Experimental
1	98.9	2.2	99.6	1.5	98.1	3.0	98.8	2.3	98.4	2.7	100.9	0.2	99.9	1.2	100.8	0.3	101.1
2	36.6	1.8	31.7	3.1	38.1	3.3	36.8	2.0	38.5	3.7	39.1	4.3	38.8	4.0	37.9	3.1	34.8
3	65.3	1.0	67.8	1.5	66.8	0.5	68.5	2.2	66.4	0.1	70.0	3.7	62.8	3.5	69.1	2.8	66.3
4	86.0	3.2	78.7	4.1	91.5	8.7	78.7	4.1	81.2	1.6	90.8	8.0	88.2	5.4	84.7	1.9	82.8
5	68.1	0.7	64.0	4.8	66.5	2.3	63.9	4.9	68.8	0.0	71.0	2.2	72.9	4.1	71.8	3.0	68.6
6	18.3	1.0	18.3	1.0	19.2	1.9	19.0	1.7	18.9	1.6	19.1	1.8	18.2	0.9	18.2	0.9	17.3
Sum of Δ		10.0		16.0		19.6		17.2		9.7		20.2		19.1		12.1	
DP4 (%)	6.7		9.1		0.0		16.0		46.2		0.6		0.0		21.3		

Figure S14. Characterization of sugar S2 using molecular modeling and DFT calculations



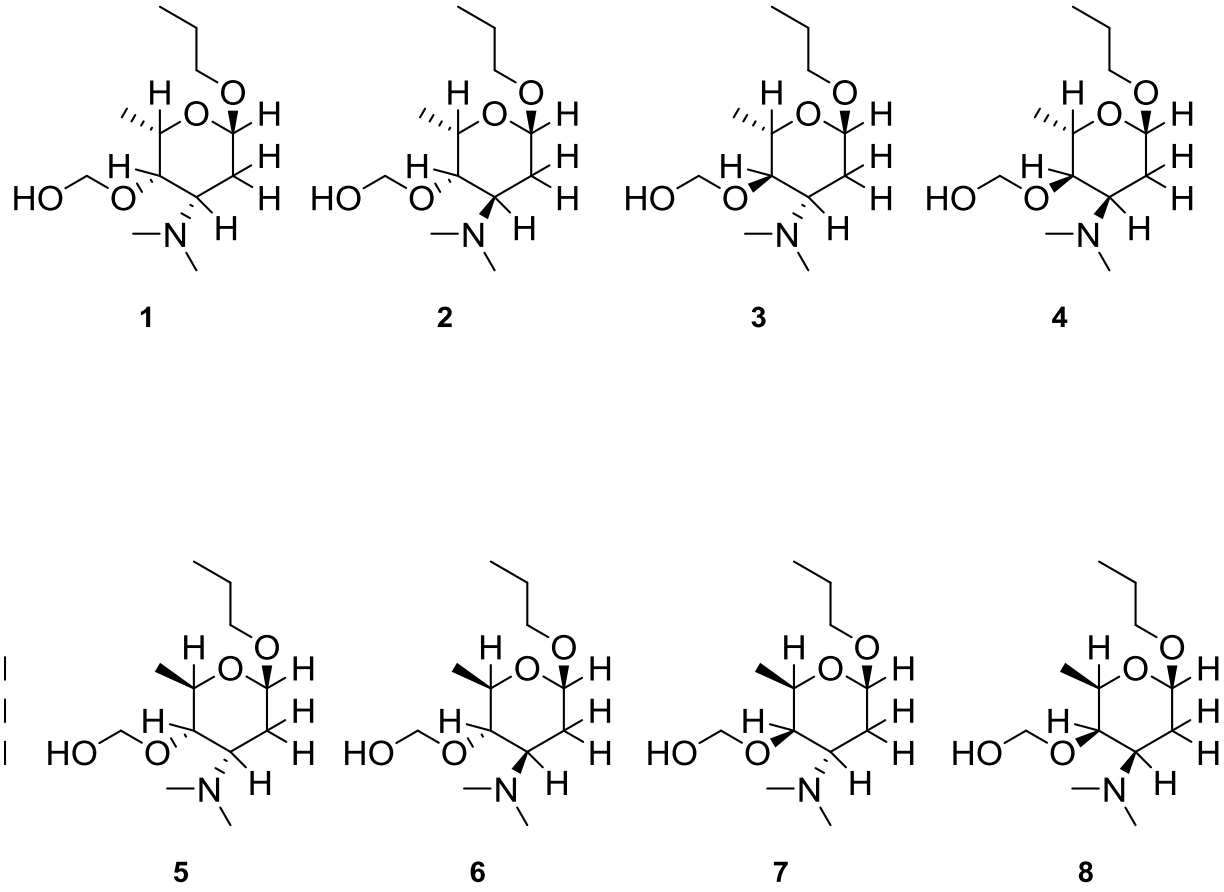
	1	Δ	2	Δ	3	Δ	4	Δ	5	Δ	6	Δ	7	Δ	8	Δ	Experimental
1	98.2	2.9	96.5	4.6	97.3	3.8	96.0	5.1	99.6	1.5	98.5	2.6	98.7	2.4	99.5	1.6	101.1
2	34.5	8.9	37.0	6.4	38.9	4.5	43.8	0.4	43.3	0.1	41.4	2.0	36.5	6.9	36.9	6.5	43.4
3	92.2	10.4	88.3	14.3	94.3	8.3	87.6	15.0	91.8	10.8	94.5	8.1	92.9	9.7	92.9	9.7	102.6
4	76.6	12.4	77.7	11.3	80.9	8.1	80.9	8.1	86.0	3.0	81.6	7.4	75.7	13.3	73.3	15.7	89.0
5	66.9	6.8	65.6	8.1	67.2	6.5	66.6	7.1	71.1	2.6	71.7	2.0	70.7	3.0	71.3	2.4	73.7
6	19.0	0.8	17.7	2.1	18.5	1.3	19.0	0.8	19.1	0.7	19.1	0.7	18.7	1.1	18.9	0.9	19.8
7	26.2	6.6	26.0	6.4	19.4	0.2	27.5	7.9	27.0	7.4	20.0	0.4	27.0	7.4	24.4	4.8	19.6
Sum of Δ		42.2		46.9		32.4		36.5		18.6		22.9		36.3		36.8	
DP4 (%)	0.0		0.0		47.9		0.0		0.1		52.0		0.0		0.0		

Figure S15. Characterization of sugar S3 using molecular modeling and DFT calculations



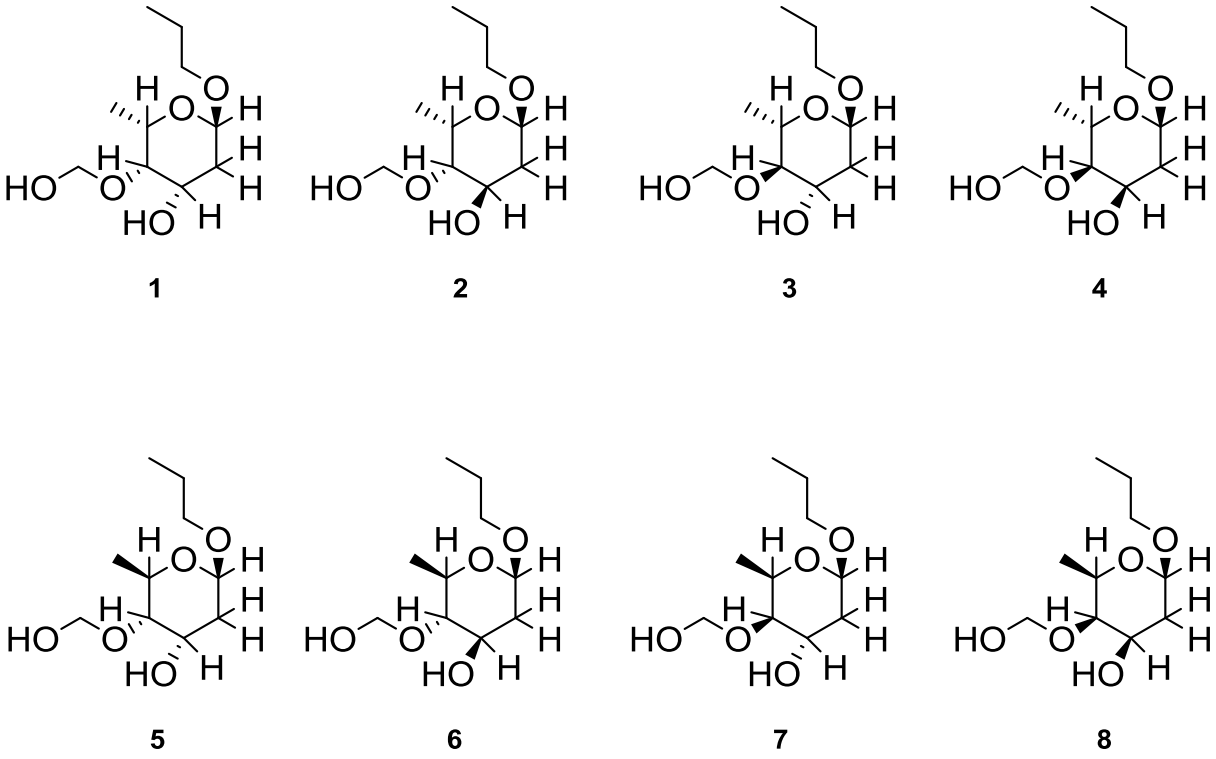
	1	Δ	2	Δ	3	Δ	4	Δ	5	Δ	6	Δ	7	Δ	8	Δ	Experimental
1	98.1	4.8	99.3	3.6	98.3	4.6	97.8	5.1	98.2	4.7	100.4	2.5	99.3	3.6	100.6	2.3	102.9
2	36.5	2.7	31.9	1.9	39.9	6.1	36.0	2.2	39.7	5.9	40.5	6.7	35.4	1.6	37.9	4.1	33.8
3	65.8	0.9	69.3	2.6	70.9	4.2	68.6	1.9	70.8	4.1	73.2	6.5	71.9	5.2	68.8	2.1	66.7
4	72.6	0.4	71.6	0.6	77.6	5.4	71.5	0.7	74.1	1.9	78.3	6.1	71.8	0.4	71.9	0.3	72.2
5	67.2	1.5	64.9	3.8	69.2	0.5	67.7	1.0	71.1	2.4	72.8	4.1	70.7	2.0	72.4	3.7	68.7
6	18.1	0.9	17.9	0.7	18.8	1.6	18.8	1.6	18.9	1.7	18.5	1.3	17.6	0.4	17.9	0.7	17.2

Figure S16. Characterization of sugar S4 using molecular modeling and DFT calculations



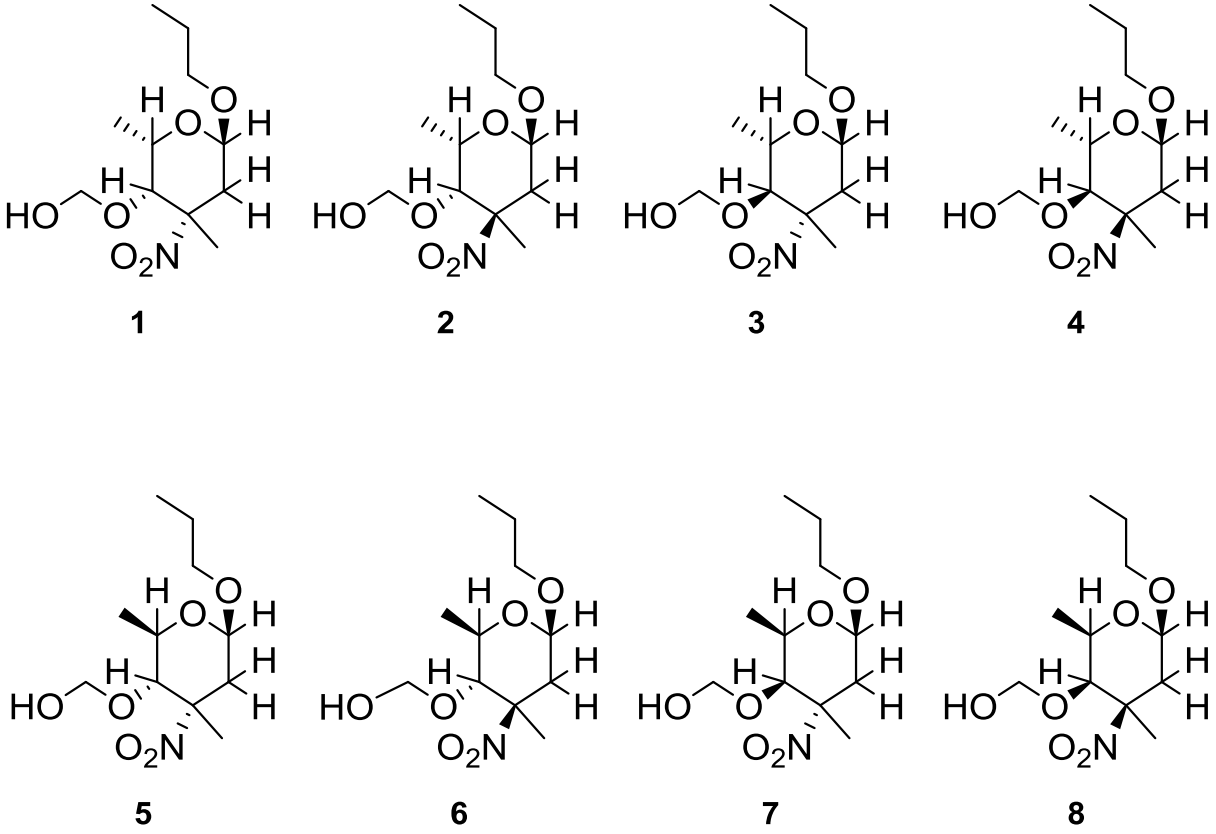
	1	Δ	2	Δ	3	Δ	4	Δ	**5**	**Δ**	6	Δ	7	Δ	8	Δ	Experimental
1	97.6	4.3	95.2	6.7	97.4	4.5	99.0	2.9	98.9	3.0	101.2	0.7	99.1	2.8	101.4	0.5	101.9
2	31.3	1.2	29.0	1.1	27.7	2.4	26.0	4.1	35.8	5.7	28.7	1.4	28.8	1.3	32.4	2.3	30.1
3	62.5	1.4	61.3	2.6	62.0	1.9	58.9	5.0	61.7	2.2	65.8	1.9	58.1	5.8	66.5	2.6	63.9
4	78.8	3.3	78.7	3.2	82.2	6.7	77.0	1.5	79.7	4.2	80.8	5.3	80.1	4.6	78.1	2.6	75.5
5	69.7	0.2	73.3	3.4	69.1	0.9	67.9	2.0	76.0	6.1	73.7	3.8	74.6	4.7	73.3	3.4	69.9
6	18.7	0.2	13.7	4.8	19.4	0.9	19.4	0.9	20.1	1.6	19.2	0.7	17.8	0.7	18.6	0.1	18.5
7	41.0	3.6	39.0	5.6	38.9	5.7	41.7	2.9	41.4	3.2	39.3	5.3	38.7	5.9	41.3	3.3	44.6
Sum of Δ		14.3		27.4		22.9		19.3		26.0		19.1		25.9		14.7	
DP4 (%)	26.2		0.1		0.2		32.6		0.0		1.7		0.0		39.2		

Figure S17. Characterization of sugar S5 using molecular modeling and DFT calculations



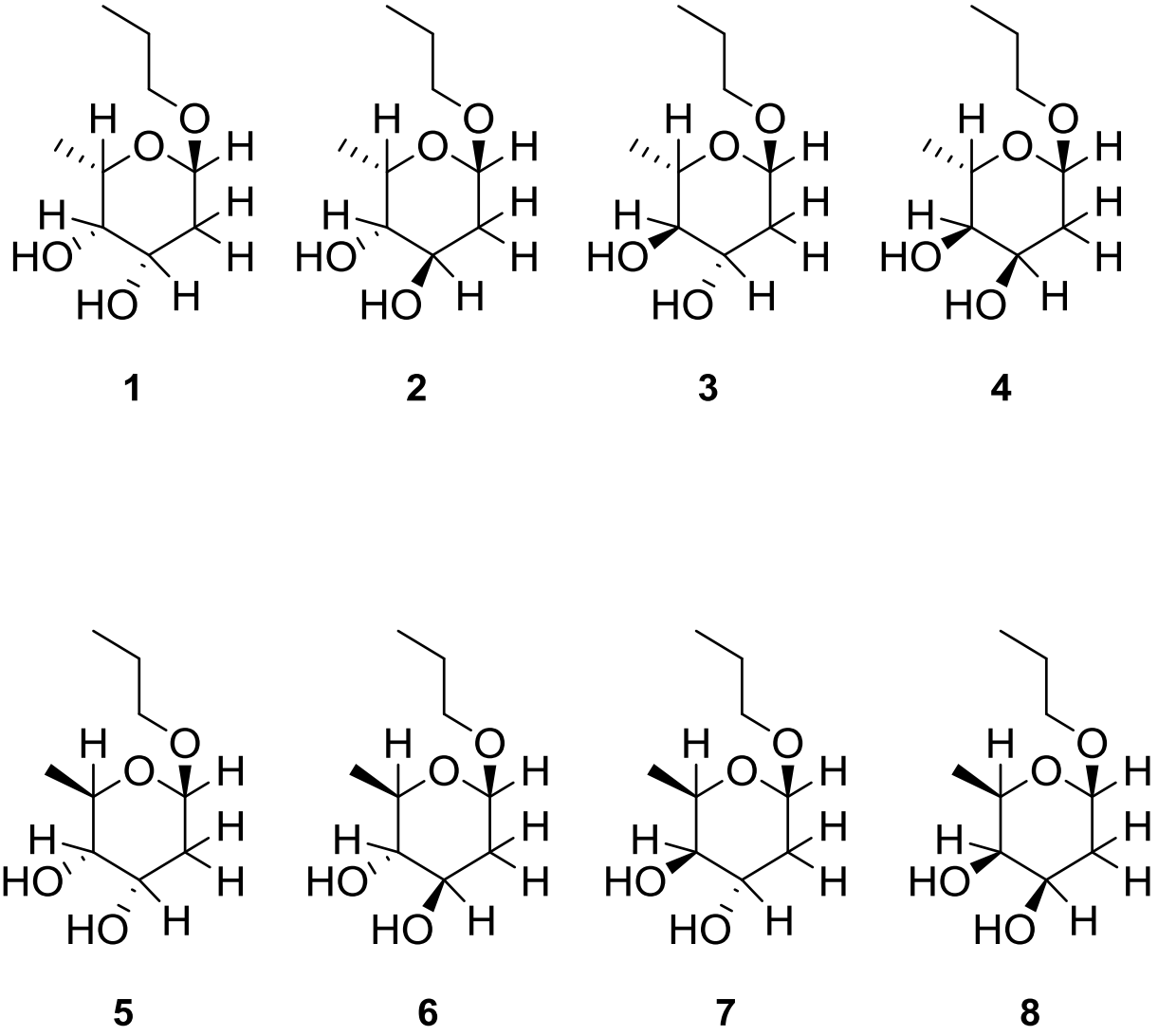
	1	Δ	2	Δ	3	Δ	4	Δ	5	Δ	6	Δ	7	Δ	8	0.3	Experimental
1	98.9	2.2	99.6	1.5	98.1	3.0	98.8	2.3	98.4	2.7	100.9	0.2	99.9	1.2	100.8	2.7	101.1
2	36.6	1.4	31.7	3.5	38.1	2.9	36.8	1.6	38.5	3.3	39.1	3.9	38.8	3.6	37.9	2.8	35.2
3	65.3	1.0	67.8	1.5	66.8	0.5	68.5	2.2	66.4	0.1	70.0	3.7	62.8	3.5	69.1	1.8	66.3
4	86.0	3.1	78.7	4.2	91.5	8.6	78.7	4.2	81.2	1.7	90.8	7.9	88.2	5.3	84.7	3.2	82.9
5	68.1	0.5	64.0	4.6	66.5	2.1	63.9	4.7	68.8	0.2	71.0	2.4	72.9	4.3	71.8	0.8	68.6
6	18.3	0.9	18.3	0.9	19.2	1.8	19.0	1.6	18.9	1.5	19.1	1.7	18.2	0.8	18.2	11.7	17.4
Sum of Δ		9.2		16.2		18.8		16.6		9.4		19.8		18.7		0.3	
DP4 (%)	9.1		6.5		0.0		16.3		45.9		0.8		0.0		21.4		

Figure S18. Characterization of sugar S6 using molecular modeling and DFT calculations



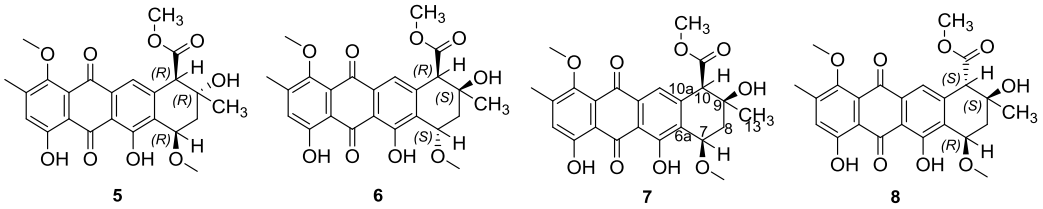
	1	Δ	2	Δ	3	Δ	4	Δ	5	Δ	6	Δ	7	Δ	8	Δ	Experimental
1	98.2	2.9	96.5	4.6	97.3	3.8	96.0	5.1	99.6	1.5	98.5	2.6	98.7	2.4	99.5	1.6	101.1
2	34.5	8.1	37.0	5.6	38.9	3.7	43.8	1.2	43.3	0.7	41.4	1.2	36.5	6.1	36.9	5.7	42.6
3	92.2	1.9	88.3	2.0	94.3	4.0	87.6	2.7	91.8	1.5	94.5	4.2	92.9	2.6	92.9	2.6	90.3
4	76.6	8.3	77.7	7.2	80.9	4.0	80.9	4.0	86.0	1.1	81.6	3.3	75.7	9.2	73.3	11.6	84.9
5	66.9	4.9	65.6	6.2	67.2	4.6	66.6	5.2	71.1	0.7	71.7	0.1	70.7	1.1	71.3	0.5	71.8
6	19.0	0.0	17.7	1.3	18.5	0.5	19.0	0.0	19.1	0.1	19.1	0.1	18.7	0.3	18.9	0.1	19.0
7	26.2	0.7	26.0	0.5	19.4	6.1	27.5	2.0	27.0	1.5	20.0	5.5	27.0	1.5	24.4	1.1	25.5
Sum of Δ		26.1		27.0		20.6		18.2		5.6		11.5		21.7		22.1	
DP4 (%)	0.0		0.0		0.1		17.4		64.6		0.1		0.0		17.8		

Figure S19. Characterization of sugar S7 using molecular modeling and DFT calculations



	1	Δ	2	Δ	3	Δ	4	Δ	5	Δ	6	Δ	7	Δ	8	Δ	Experimental
1	98.1	5.0	99.3	3.8	98.3	4.8	97.8	5.3	98.2	4.9	100.4	2.7	99.3	3.8	100.6	2.5	103.1
2	36.5	2.7	31.9	1.9	39.9	6.1	36.0	2.2	39.7	5.9	40.5	6.7	35.4	1.6	37.9	4.1	33.8
3	65.8	0.9	69.3	2.6	70.9	4.2	68.6	1.9	70.8	4.1	73.2	6.5	71.9	5.2	68.8	2.1	66.7
4	72.6	0.3	71.6	0.7	77.6	5.3	71.5	0.8	74.1	1.8	78.3	6.0	71.8	0.5	71.9	0.4	72.3
5	67.2	1.9	64.9	4.2	69.2	0.1	67.7	1.4	71.1	2.0	72.8	3.7	70.7	1.6	72.4	3.3	69.1
6	18.1	1.0	17.9	0.8	18.8	1.7	18.8	1.7	18.9	1.8	18.5	1.4	17.6	0.5	17.9	0.8	17.1

Figure S20. Characterization of anthracycline core using molecular modeling and DFT calculations



5 6 7 8

	5	Δ	6	Δ	7	Δ	8	Δ	Experimental
6a	128.5	3.7	129.0	3.2	126.7	5.5	127.0	5.2	132.2
7	71.7	1.1	72.9	0.1	70.2	2.6	73.0	0.2	72.8
8	39.3	0.7	37.4	2.6	42.7	2.7	32.6	7.4	40.0
9	71.5	1.2	72.9	2.6	71.3	1.0	72.0	1.7	70.3
10	60.6	1.2	58.7	0.7	60.6	1.2	60.7	1.3	59.4
10a	139.4	5.4	141.2	3.6	145.2	0.4	142.1	2.7	144.8
13	26.6	3.6	30.7	0.5	31.2	1.0	27.4	2.8	30.2
COO	165.9	7.0	165.1	7.8	165.0	7.9	166.3	6.6	172.9
OCH_3	51.2	1.8	51.2	1.8	51.0	2.0	51.4	1.6	53.0
Sum of Δ		25.7		22.9		24.3		29.5	
DP4 (%)	49.1		41.9		8.8		0.2		

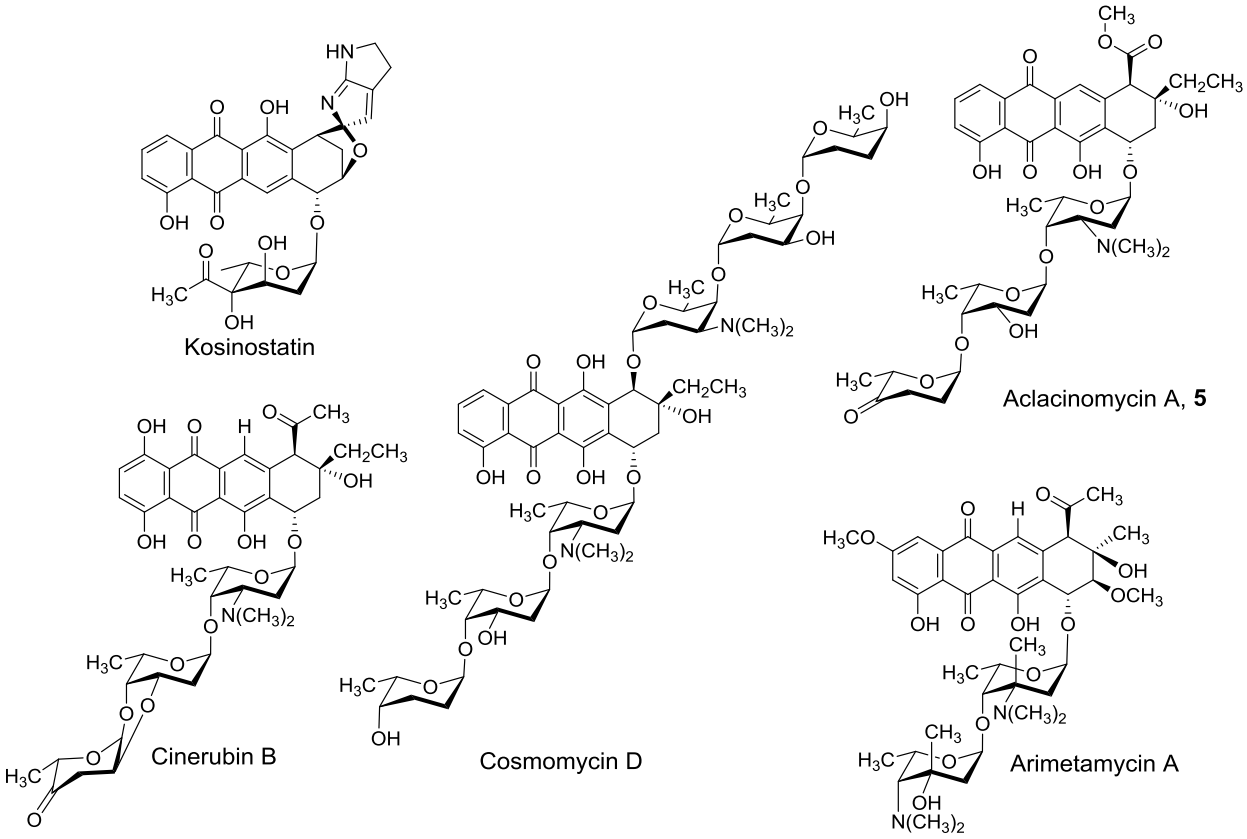


Figure S21. Structures of natural products sharing biosynthetic and structural similarities to keyicin.

Figure S22. Clustered chemical genomics profile generated using a barcoded *E. coli* deletion collection. Cell populations were treated with either keyicin (12.5µg/mL), methyl methanesulfonate (MMS, 0.0125%). or ethidium bromide (EtBr, 100µg/mL). MMS and EtBr are established DNA damaging agents. Red indicates negative genetic interactions between gene mutants and compounds relative to solvent (DMSO) control. Each profile represents the average of 3 independent replicates.

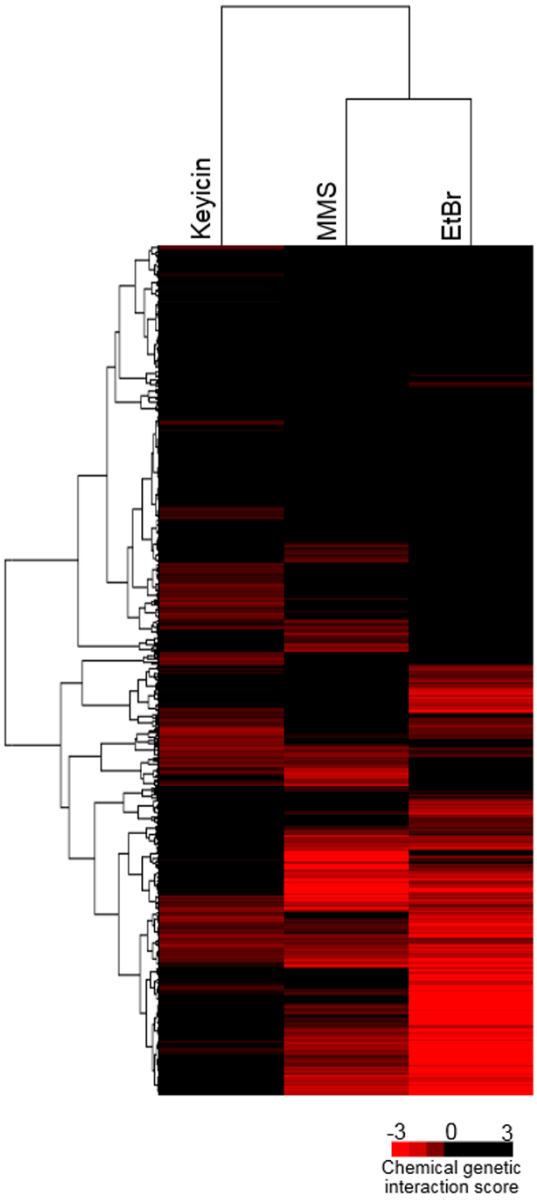


Table S3. Summary of BGC genes identified in Micromonospora sp. WMMB-235 with proposed roles in keycin biosynthesis on basis of comparisons to nogalamycin BGC components.

kyc Gene Name	kyc Accession #	Nogalamycin (BGC0000250) Gene Name	Nogalamycin (BGC0000250) Accession #	Protein Percent Identity	E-value	MiBiG Annotation (putative function of gene product
kyc7	OHX07111.1	snogK	AAF01814.1	44.04	5E-86	putative dTDP-glucose-4,6-dehydratase
kyc8	OHX01512.1	snogJ	AAF01820.1	74.31	8E-159	putative dTDP-glucose synthase, glucose-1-phosphate adenylyl/thymidylyltransferase
kyc9	OHX01513.1	snoaM	AAF01818.1	77.99	5E-148	putative polyketide cyclase
kyc10	OHX07112.1	snoO	AAF01807.1	52.6	6E-40	Nuclear transport factor 2 (NTF2-like) superfamily
kyc12	OHX01515.1	snogE	AAF01809.1	43.02	2E-87	putative glycosyl transferase
kyc13	OHX01516.1	snoa1	CAA12017.1	65.71	0	KSI (minimal PKS), Beta-ketoacyl synthase
kyc14	OHX01517.1	snoa2	CAA12018.1	62.03	2E-167	KSII (minimal PKS), Beta-ketoacyl synthase
kyc15	OHX01518.1	snoa3	CAA12019.1	48.15	6E-17	ACP, polyketide
kyc17	OHX01520.1	snoK	AAF01812.1	62	3E-116	non-heme iron α-ketoglutarate (α-KG)–dependent carbocyclase
kyc19	OHX01522.1	snoG	AAF01816.1	37.93	3E-89	SMCOG1248:methyltransferase
kyc20	OHX01523.1	snogE	AAF01809.1	46.51	1E-101	putative glycosyl transferase
kyc21	OHX01524.1	snoaE	CAA12012.1	53.31	4E-111	aromatase, polyketide
kyc22	OHX01525.1	snoaD	CAA12013.1	74.62	6E-133	polyketide ketoreductase, short-chain_dehydrogenase/reductase_SDR
kyc24	OHX07113.1	snogE	AAF01809.1	45.73	4E-99	putative glycosyl transferase
kyc25	OHX01526.1	snogE	AAF01809.1	61.87	4E-178	putative glycosyl transferase
kyc26	OHX01527.1	snogN	AAF01817.1	42.62	3E-57	SMCOG1007:cytochrome_P450
kyc27	OHX01528.1	snogG	CAA12010.1	54.58	7E-104	putative dTDP-4-keto-6-deoxyhexose reductase
kyc28	OHX01529.1	snogF	CAA12011.1	68.16	3E-97	3,5-epimerase
kyc29	OHX01530.1	snogE	AAF01809.1	41.33	1E-83	putative glycosyl transferase
kyc31	OHX01532.1	snoaW	AAF01810.1	50.88	4E-80	putative hydroxylase
kyc32	OHX01533.1	snogE	AAF01809.1	43.55	2E-88	putative glycosyl transferase
kyc32	OHX01533.1	snogZ	CAB59003.1	28.47	4E-28	putative dTDP-4-dehydrorhamnose reductase, NAD-dependent epimerase/dehydratase
kyc33	OHX01534.1	snoaF	AAF01806.1	58.37	3E-96	C-7 ketoreductase
kyc34	OHX01535.1	snoaL	AAF01813.1	77.78	2E-79	nogalonic acid methyl ester cyclase
kyc35	OHX07114.1	snoaC	CAA12014.1	63.83	3E-120	methyltransferase, aklanonic acid
kyc36	OHX01536.1	snoaW	AAF01810.1	60.73	6E-99	putative hydroxylase
kyc38	OHX01538.1	snoaB	CAA12015.1	60.92	1E-32	oxygenase, polyketide
kyc42	OHX01541.1	snorA	CAA12016.1	53.23	7E-178	activator, polyketide
kyc44	OHX01543.1	snogA	AAF01819.1	66.81	5E-111	putative amino methyltransferase
kyc45	OHX01544.1	snogI	AAF01821.1	73.68	0	putative aminotransferase, DegT/DnrJ/EryC1/StrS aminotransferase
kyc46	OHX01545.1	snogH	CAA12009.1	57.45	0	putative 2,3-dehydratase
kyc48	OHX01546.1	snogZ	CAB59003.1	62.96	9E-167	putative dTDP-4-dehydrorhamnose reductase, NAD-dependent epimerase/dehydratase
kyc50	OHX01548.1	snogX	CAA12020.1	59.4	2E-98	putative N-methylase
kyc51	OHX01549.1	snoL	AAF01808.1	63.16	6E-61	SnoaL-like polyketide cyclase; pfam07366
kyc52	OHX01550.1	snogD	AAF01811.1	64.89	1E-159	putative glycosyl transferase, MGT family
kyc54	OHX01552.1	snorA	CAA12016.1	35.47	3E-76	activator, polyketide
kyc62	OHX01559.1	snorA	CAA12016.1	35.87	4E-73	activator, polyketide

Table S4. Selected GTs from anthracycline BGCs with similarity to putative kyc GTs

kyc Accession #	SEARCHGTr Consensus	Predicted Substrate/Function	Reference (PMID)
OHX01515.1	AknK	L-2-deoxyfucose	15078101
OHX01523.1	AknK	L-2-deoxyfucose	15078101
OHX07113.1	AknK	L-2-deoxyfucose	15078101
OHX01526.1	SnogE	Nogalose	22120896
OHX01530.1	AknK	L-2-deoxyfucose	15078101
OHX01533.1	AknK, dauH	L-2-deoxyfucose, L-daunosamine	15078101, 8655529
OHX01546.1	SnogZ	Redundant; can activate other glycosyltransferases	22120896, 25524457
OHX01550.1	SnogD	Nogalamine	22120896

Table S5. Overview of overall cluster similarities between kyc cluster and other anthracycline members

ıClusterBlast (antiSMASH 4)

Cluster	MIBiG Accession	Percent of Genes Similar to kyc cluster
Cinerubin B	BGC0000212	88%
Cosmomycin D	BGC0001074	88%
Arimetamycin	BGC0000199	84%
Kosinostatin	BGC0001073	76%
Aclacinomycin	BGC0000191	72%
Nogalamycin	BGC0000250	52%
Aclacinomycin	BGC0000192	44%
BE-7585A	BGC0000203	40%
Cosmomycin	BGC0000214	24%

Table S6: Average chemical genetic interaction profiles for keyicin (12.5 µg/mL), ethidium bromide (EtBr, 100µg/mL), and methyl methanesulfonate (MMS, 0.0125%)

Gene	Keyicin	MMS	EtBr
yegP	-0.329342	0.764072	0.108858
allC	-0.631506	1.348474	0.230172
slyA	-1.029156	3.312604	0.894277
acrR	-0.870094	2.634704	0.747246
melR	-0.416204	1.474132	0.409495
fliJ	-0.465341	1.599695	0.409426
mutM	-0.598777	1.274581	0.349647
ksgA	-1.178998	3.060106	0.814421
nhaA	-0.428125	1.02815	0.28988
fliG	-0.688832	1.915999	0.726952
entD	-0.625749	1.527119	0.580673
ynaJ	-0.475413	1.469073	0.111823
fimA	-0.826211	3.402978	0.312207
purK	-1.509718	5.516694	0.64496
gpp	-0.649773	2.420248	0.264966
djlA	-0.879816	3.584505	0.596893
aroF	-0.02916	0.952117	0.085389
fliC	-0.107722	1.593072	0.23363
sucD	-0.064182	1.128427	0.165592
yafV	-0.11706	1.746174	0.296911
rpmF	-0.059291	0.541752	0.076701
yadE	-0.17007	1.493138	0.118234
sixA	0.339052	6.318928	0.795778
kefC	0.072222	2.22186	0.273984
gadX	0.130399	3.071498	0.482787
ypjD	-0.152502	5.723593	0.930226
htrE	0.001045	1.17862	0.202515
yqgE	-0.007739	1.495201	0.258224
fimH	-0.351876	3.431692	0.732845
ygjH	-0.099778	0.683142	0.162068
plsX	-0.36295	1.944811	0.320535
ybdM	-0.405749	2.456645	0.431262
nmpC	0.616897	3.519173	-0.11073
fliE	0.255315	1.650448	-0.018023
hscC	0.122743	0.871652	0.012743
cheR	0.176267	1.680984	-0.053454
hslJ	0.062998	0.897902	-0.019584
yhfW	0.034412	3.549235	-0.047718
yfaQ	-0.010183	0.653952	0.017471
ccmD	0.005102	1.436231	-0.091092
tatE	-0.01422	1.30812	-0.070064
purN	0.130836	2.953256	-0.410946
aroG	0.062556	1.390407	-0.162648
srmB	-0.456322	5.567656	-0.700622
yadL	-0.307596	2.03151	-0.301795
sgcE	-0.113358	0.80459	-0.070139
srlR	-0.071762	0.584869	-0.036864
ybfE	-0.464418	3.512956	-0.149563
nagC	-0.247906	1.671148	-0.002693
yhdX	0.345778	1.768078	0.437188
carA	0.61049	3.389678	0.87466
yhcM	0.537575	3.094197	0.882815
hflK	0.88401	7.20492	1.816648
nudH	0.426033	2.930722	0.738854
rfbB	0.27754	1.818569	0.407465
icd	0.147459	2.311789	0.565154
mngA	0.171425	1.349674	0.461102

carB	0.375268	3.691857	1.092057
wbbH	0.222823	2.850715	0.859224
ydiE	-0.017939	1.113463	0.492941
ybbN	-0.060934	2.852219	1.349213
hemY	-0.132469	3.82119	1.553486
rmuC	-0.0127	0.990425	0.409382
pinH	-0.022555	1.481046	0.602467
panF	0.029781	2.82718	1.131062
rihA	0.003122	1.118937	0.436346
ygbE	0.020879	0.774621	0.325112
hycF	0.03662	1.776957	0.630032
xseA	0.153655	2.678238	0.945267
damX	0.049005	2.599833	0.82121
deoC	0.007172	1.277752	0.387417
aaeA	-0.005158	1.158508	0.360847
ydcM	-0.0186	0.723416	0.229699
marR	-0.176209	4.188716	1.143488
dsbB	-0.073026	1.986883	0.530452
yeiR	-0.249033	3.751146	0.90887
ytfP	0.215915	0.809653	0.369644
yfcT	0.702948	2.4397	1.12828
gspC	0.195	0.700294	0.351967
treR	0.977189	3.462828	1.72944
ybcI	0.303462	1.255507	0.594339
ccmB	0.730346	3.249693	1.560382
flhB	0.628927	2.322831	1.296677
rfaS	0.977912	3.546368	1.95947
menD	0.140028	1.480801	0.708735
gltD	0.213204	2.229872	1.054266
corA	0.397566	3.760667	1.653815
yidR	0.972813	4.986153	2.650047
flhA	0.611414	3.399494	1.752683
gntT	0.202563	1.353316	0.573517
fbp	0.186259	1.336412	0.601832
dacA	0.263031	1.385492	0.606649
ygfZ	0.291745	1.503309	0.709801
treB	0.214413	1.271796	0.60951
greA	1.148956	5.997074	2.355075
rpmB	0.597399	3.424233	1.222948
glnD	0.27222	1.557026	0.571566
yjiQ	0.209933	0.868493	0.336821
yadM	0.443004	1.831571	0.730366
ydjI	0.040133	0.179906	0.068983
ilvI	0.224975	0.978724	0.35855
proP	0.777294	2.724546	0.7144
pfkA	1.131365	3.128974	1.004922
yqjG	0.64012	2.099258	0.703218
yeaP	0.705403	1.84922	0.476159
sapF	-0.292639	2.596334	1.236153
pyrC	-0.678052	4.684748	2.04726
xseB	-0.210825	1.045087	0.470261
ompF	-0.2315	0.933385	0.396045
fimF	-0.659518	3.643505	1.102932
glnG	-0.280179	1.454442	0.397268
chpR	-0.246792	1.300259	0.472174
yfcS	-0.256441	1.699787	0.626043
ybcM	-0.177413	1.156795	0.403038
pyrB	-0.23631	1.922536	1.198125
yeaW	-0.323611	2.025504	1.354613
trpB	-0.361867	1.879787	1.139543
yfiN	-0.245298	1.04961	0.764317

yeeT	-0.373325	1.419544	0.779523
yeeA	-0.225456	0.805646	0.428648
yfbB	-0.547616	2.413623	1.340384
yhdN	-2.158055	6.398396	3.063373
ybhE	0.273244	2.964181	1.571024
ycdM	0.050574	1.413153	0.745962
fliO	0.064128	1.077634	0.590232
yjeF	0.02355	0.609988	0.336787
yjfO	-0.078983	1.10046	0.563091
rep	-0.247203	2.122735	1.187437
ubiC	-0.2891	3.266067	1.778717
yebV	-0.088152	1.027924	0.559154
nfo	-0.126114	1.471383	0.808157
ycfH	-0.025708	1.098885	0.573318
uvrY	0.004948	0.677221	0.417469
rcsD	0.041986	3.621432	2.26941
fliP	-0.010462	1.854856	1.14333
yneK	0.022063	1.018786	0.619011
cheB	-0.038631	0.716549	0.484366
purD	-0.245943	4.034187	2.392316
yhjJ	-0.080127	1.53669	0.9252
purC	-0.195615	3.737383	2.290535
prpR	-0.151114	2.623963	1.623959
yehS	-0.054727	1.658995	0.96271
wzxE	2.589645	3.542018	0.190494
atpA	1.659964	2.798407	0.19418
ycjM	0.04464	0.070126	0.002985
ybiV	0.716497	1.375188	0.026048
ubiF	0.606145	1.448189	0.212689
yceI	0.500794	1.030146	0.141379
yjjK	1.433726	1.494648	0.330658
yebO	0.713283	0.814686	0.275894
yidP	1.092613	1.291693	0.515222
hscB	0.997225	1.226131	0.293042
metC	0.285669	0.391109	0.104025
yddG	0.743764	1.513341	0.587615
rffC	1.574616	2.974908	1.17877
citB	0.547945	1.077233	0.488339
ybaP	0.926065	1.82338	0.602332
hepA	1.86874	3.65565	1.080289
ggt	0.286656	0.507991	0.103412
yicR	0.549793	1.028757	0.272092
ypdJ	0.211667	0.409508	0.093474
rpiB	0.5206	0.824172	0.247902
ytfB	0.507816	0.772281	0.2046
proX	0.382998	0.624652	0.149147
yghY	0.805999	1.194186	0.421188
yihP	2.089957	3.012759	1.060114
proV	0.663635	1.342506	1.015708
dcuB	0.296644	0.621613	0.454526
iadA	0.800565	1.55201	1.117765
fadB	1.231357	2.479296	1.991824
yraQ	0.55687	1.14613	0.928945
ybdZ	0.424033	0.997572	0.747063
mhpD	0.278509	0.618149	0.455226
fliD	0.796459	1.886132	1.47792
guaB	1.113993	2.610915	2.113615
cycA	0.332172	0.862839	0.623904
gshB	0.93054	2.458054	1.90206
melA	0.654491	1.798792	1.449507
ilvN	1.127614	2.492656	1.639773

ulaF	0.414376	0.987832	0.65247
fre	1.081354	2.589297	1.481538
yjgF	1.123148	2.703039	1.633879
galR	1.430089	3.137223	1.81957
yigE	0.721584	1.961284	1.14718
ykgC	0.868366	2.311195	1.456686
fruK	1.192641	3.271744	1.760884
purH	1.858394	4.504509	2.291047
yafD	1.466401	3.969014	1.825301
rffA	1.83639	4.478025	2.067261
yfbF	0.715643	1.722769	0.745692
yihQ	1.60365	1.739261	1.152241
nuoA	0.833874	0.869212	0.660428
uhpB	1.744364	1.684452	1.474557
yihT	1.49784	1.578119	1.296421
trmU	2.103505	2.248398	1.931201
yagQ	2.124576	2.211217	1.978696
glpF	2.886486	3.43355	3.000012
hdeB	1.477056	1.858118	1.664095
ydbH	2.219461	2.841275	2.544372
trmE	2.202168	3.87448	2.529218
fliN	1.236032	2.178936	1.299676
ydgD	0.521921	0.889276	0.472497
crcA	0.7723	1.182522	0.876367
thiQ	0.68948	1.048486	0.736681
yrfF	1.086706	1.561993	0.96192
pepA	0.911022	1.23474	0.752544
garD	0.722755	0.920201	0.539227
yliD	0.219924	0.289047	0.166262
dgt	-0.424501	3.32386	3.190834
emrD	-0.19504	1.103344	1.181615
rnt	-0.100884	0.690521	0.702689
yqiK	-0.13729	0.764373	0.768971
bglF	-0.327665	1.552915	1.459226
narH	-0.162685	1.821914	1.870435
yefM	-0.250528	2.584157	2.608309
pflD	-0.104801	1.10545	1.169031
sucC	-0.24899	4.298513	4.27361
rlpA	-0.104192	1.8794	1.869213
rffT	-0.136167	1.166395	0.999999
yeeS	-0.475965	2.793648	2.398328
rsxB	-0.117404	0.781513	0.688307
purF	-0.74485	5.980206	4.702888
panC	-0.259695	2.363781	1.895955
pspC	-0.071803	0.778184	0.604963
yjdF	-0.185414	1.482578	1.109817
mepA	-0.122181	0.904781	0.67841
yodB	-0.174066	1.153712	0.900773
hdeD	-0.070299	0.991536	0.847344
ydiQ	-0.167781	2.105805	1.818741
yafJ	-0.13153	2.017036	1.862751
cpxP	-0.05479	0.787653	0.705368
rbsA	-0.117277	2.395245	1.869496
ychH	-0.117054	1.937001	1.463567
gpt	-0.100928	2.494449	2.029842
glxK	-0.093997	3.075377	3.63804
hrpB	-0.129802	2.332702	2.792169
abgR	-0.070603	1.281019	1.466331
yrfG	-0.207805	1.607583	1.915489
ulaD	-0.152018	1.306985	1.577085
ymfN	-0.197322	2.090622	2.453329

pdxB	-0.127902	0.986442	1.239476
yacG	-0.148655	2.529613	3.302559
flgG	-0.091534	1.484098	1.977286
glpQ	-0.080705	1.951048	2.52824
yhbQ	-0.052417	1.041505	1.445073
leuD	0.08868	2.307407	2.774462
yehY	0.151728	2.772002	3.326154
yahI	0.051754	2.908746	3.546565
rzpD	-0.042711	2.686489	2.955147
kbl	0.035513	1.582514	1.763478
ycbY	0.061512	2.104783	2.207771
panB	0.38673	5.213384	3.779746
ybeZ	0.173301	2.824089	1.971485
clpB	0.001378	0.074799	0.053908
flu	0.517484	3.38926	1.966362
ptsN	0.403599	3.680546	2.228696
yfaE	0.104635	1.333333	0.777174
gltA	0.351254	3.076	2.02124
cheZ	0.179542	1.478656	1.021118
purL	0.701374	4.337102	3.006018
yneE	0.093652	0.622574	0.4054
nadR	0.768271	3.073817	2.197889
prmB	0.805765	3.750152	2.666442
agaI	0.494403	2.299219	1.57103
yhaJ	0.31728	1.342749	0.883576
yibK	0.102661	0.493779	0.304719
allD	0.098417	0.33709	0.229512
yigZ	0.401229	1.486336	0.934784
yajL	0.445375	1.726971	1.508724
ygiH	0.161767	0.695694	0.636518
wcaL	0.455922	1.491828	1.312459
acnB	0.722431	2.606234	2.157461
yifK	0.571384	1.752373	1.678942
ydeJ	0.108756	0.288097	0.287529
fepA	1.282975	7.035098	6.937397
phnN	0.420336	2.027124	1.969437
ydeS	0.540567	2.006418	2.017886
ais	0.021539	1.844471	1.658051
napH	-0.039919	2.405163	2.08348
yadI	0.064119	1.73709	1.647241
yhcF	0.151589	3.254048	2.899677
ybaO	0.203313	3.367416	2.896923
yifL	0.209049	2.844707	2.487817
frmA	0.117339	1.373317	1.226183
chpB	0.04798	1.396683	1.157936
hisM	0.094799	3.54419	2.922729
yehZ	0.262798	2.10618	1.967675
proB	0.220119	2.066779	1.887647
btuC	0.348093	2.253749	1.878602
aroB	0.87176	4.799233	4.06809
udk	0.210899	1.228054	1.028302
yfdI	0.38331	2.529241	2.208524
add	0.073074	0.477865	0.40939
sgbH	0.16838	1.20218	1.021705
malZ	0.099921	0.528028	0.475787
pyrF	0.347215	2.281323	2.079772
yhaM	0.084187	0.51937	0.480849
gspG	0.121299	1.055383	0.853169
yigG	0.175891	1.825514	1.496007
ppdA	0.151088	1.57471	1.274534
ygdL	0.310569	2.072278	1.52872

ycfP	0.237738	1.517371	1.208971
ytfN	0.251387	1.516961	1.188198
uspG	0.112181	0.561868	0.441953
trxB	0.431128	1.378443	1.567101
yacF	1.236331	4.181184	5.014564
sdhC	0.374848	1.400089	1.631102
ppiD	0.55884	2.724646	3.096172
trkH	0.28641	1.240111	1.461992
ymjC	0.102728	0.418787	0.470338
yjdA	0.493434	2.904087	3.205506
yhfK	0.205724	1.819317	1.954691
fruB	0.265809	1.930362	2.060703
hflC	0.706088	3.791321	4.63921
hypA	0.093967	0.555316	0.648081
yjbE	0.388343	2.646576	3.121634
prpB	0.425766	2.910778	3.370793
yeiS	0.405786	2.352983	3.037373
yegZ	0.106869	0.756743	0.952565
yfgB	0.327753	1.561612	2.042479
yfeN	0.361923	1.836862	2.412109
malE	0.612929	2.840252	3.862033
proC	0.202308	1.016964	1.378007
ugpQ	0.209381	1.243838	1.767921
ycdT	0.367637	2.576987	3.479011
yfbW	0.419623	3.106611	4.192153
ydiJ	0.358596	2.710442	3.696389
moaB	0.300304	2.263625	3.302604
asr	0.154699	0.972425	1.474205
pyrI	0.239245	1.434829	2.165309
cchB	0.397008	2.70263	4.428009
nudF	0.386774	2.063883	3.281906
panE	0.321416	1.804237	2.854154
yfeT	0.241189	1.16121	1.853568
yqhD	0.157059	2.481328	3.484282
ydbD	0.049052	1.018039	1.500182
hslR	0.137449	1.399427	2.093419
intR	0.110132	1.383735	2.00889
hisL	0.388536	1.002891	1.284178
recQ	0.828987	2.531105	3.262241
malG	0.629095	1.760782	2.299536
yheO	0.744674	1.824044	2.512395
yfcG	0.06782	0.156895	0.223878
wcaI	0.527993	1.122254	1.576256
ybhQ	0.334842	0.857212	1.256239
ybdN	0.384201	0.97182	1.511427
apaG	0.767287	2.216795	3.336396
yggT	0.546832	1.605232	2.395143
dcuA	0.526782	1.736639	2.446334
ydeW	0.240047	0.762813	1.100964
motB	0.366145	1.072906	1.523915
yafX	1.010114	2.896573	4.000545
yfaU	0.198172	0.549792	0.900439
aas	0.712071	2.219791	3.487089
ptr	0.384129	0.438099	0.55465
yegJ	0.839137	0.832065	1.167379
rffM	0.782837	0.802242	1.064649
ykgF	1.092622	1.183588	1.292051
gntR	1.951176	2.171562	2.316497
yagN	1.384759	1.405266	1.717539
mtlR	0.900057	0.955136	1.148015
glpB	1.330223	1.958239	1.808101

ybhB	1.360076	2.011289	1.986431
ygiE	0.482201	0.731223	0.726739
ulaA	0.985213	1.247897	1.331942
glpA	0.886183	1.121456	1.142249
ykfF	2.015258	2.81734	3.16658
dgoT	1.627519	2.508898	2.67723
mdtB	0.761797	1.170006	1.226678
agaD	0.820881	1.30136	1.358783
gspH	1.201234	1.890104	2.054146
yheU	1.856611	2.901703	3.319512
hemX	0.437311	0.703453	0.803562
rpmI	0.599601	1.510823	1.634845
hemN	1.243144	2.803836	3.060347
ysgA	0.6688	1.839017	2.080587
yiiR	0.299048	0.791416	0.895321
sdhD	1.078069	3.019802	3.345257
ygjK	0.819844	1.638438	1.970775
yhaK	0.344156	0.750574	0.861854
bioH	0.919386	1.971169	2.284679
wcaC	0.604763	1.27888	1.485799
yagU	0.971381	2.323649	2.79159
wcaB	0.255994	0.600603	0.704765
cbrA	0.293733	0.650807	0.82187
yahE	0.736671	1.587499	1.953012
aceB	0.800518	1.741521	1.583379
pioO	1.109338	2.571097	2.239602
hslO	0.590743	1.404763	1.242309
ppiB	1.414652	3.070478	3.261011
yajQ	0.388566	0.797871	0.838005
rffH	0.295007	0.617185	0.639231
mdtJ	0.253986	0.5054	0.556261
glgP	0.632606	1.290576	1.406222
potG	0.41179	0.826821	0.828035
yeiT	0.236453	0.467621	0.458956
fkpA	0.419577	0.777278	0.775536
gltJ	1.34613	1.352846	3.129574
appC	1.407051	1.445318	3.008283
cbrC	1.293398	1.308129	2.732506
cobS	0.654937	0.612626	1.387382
yagM	1.391414	1.87484	3.249404
yfdG	1.229424	1.60213	2.971083
ybdG	0.919509	1.20541	2.270611
yeeN	0.306633	0.346796	0.670117
ygiZ	2.148125	2.686716	5.378219
rarD	0.75265	0.993301	1.98201
ydaU	0.778418	0.899094	1.856412
yibD	1.051339	1.55228	3.047195
nuoM	0.555445	0.792489	1.471346
hisD	0.905461	1.278988	2.439627
yieL	1.406317	1.898645	2.683701
malT	0.870478	1.077318	1.54244
yieK	1.346855	1.680811	2.264985
wcaA	0.237173	0.287522	0.37643
ykfJ	1.0379	1.116993	1.731279
rsxD	0.889933	0.939961	1.404975
yhjH	0.40965	0.436251	0.650806
yagK	2.174194	2.693151	4.18183
djlB	0.273407	0.325144	0.527039
mtlA	0.282049	0.357624	0.566706
yfjI	0.564006	0.732051	1.147103
fruA	0.615581	0.803523	1.257675

sbmC	0.611654	1.043002	1.418356
tdcR	0.55368	1.028798	1.411958
folX	0.214234	0.396708	0.501407
atoD	0.684225	1.142806	1.888443
yieP	1.273389	2.222738	3.80698
soxR	0.454109	0.686602	1.11549
malK	0.280716	0.443844	0.670897
yhjY	0.790432	1.126843	1.758177
ydiR	0.514168	0.864898	1.318524
eco	0.554041	0.975963	1.499815
phnI	2.03668	1.740685	4.819794
dinD	1.237549	0.907175	2.735038
yqiH	0.999253	0.683242	2.306665
phnO	1.29933	0.747749	2.066297
yecA	0.35136	0.239126	0.563106
ydfB	1.710802	0.927658	2.923544
smtA	0.383626	0.209104	0.689039
pldB	0.501635	0.319409	0.882897
dppF	1.984023	1.346913	3.802309
yfcM	0.736593	0.522493	1.459107
yfjK	0.801553	0.603231	1.592532
ycjO	0.498064	0.380142	0.972449
yjfP	0.514854	0.393423	0.954643
phnJ	0.579503	0.438334	1.041838
yfjF	1.451159	1.054514	1.695693
ycjZ	0.588238	0.40351	0.675953
ycjW	0.731506	0.501445	0.942974
ytfH	1.390161	0.963304	1.831268
glpX	1.302593	1.015253	1.681549
hyfG	1.355289	1.003402	1.754074
hycA	1.008712	0.768186	1.336048
yiaN	1.81101	1.009291	1.803174
narG	0.578146	0.340908	0.627323
yfbU	0.792444	0.45391	1.039194
metB	0.969989	0.58898	1.234263
cspI	0.193323	0.122693	0.255476
recN	0.79753	0.402552	1.073082
ulaR	0.716042	0.344385	0.927148
yghD	0.485418	0.216134	0.650323
zntR	1.554153	1.220198	2.523706
ydeR	1.260572	0.99469	2.029263
aaeB	1.243286	0.938864	2.031311
ilvD	1.227666	1.024294	2.082802
yqjF	0.252213	0.20485	0.431835
glvC	0.615804	0.521643	1.136224
yagT	2.468288	2.189573	4.407403
nuoC	0.46427	0.41151	0.746868
gltP	0.723868	0.682549	1.180581
adiC	1.160213	0.952521	1.724925
ynhG	0.24219	0.197023	0.352616
yicE	1.02579	0.796633	1.457981
mmuP	4.100179	3.618691	5.711577
glpR	0.949751	0.669422	0.765832
rsxC	1.769055	1.102903	1.498884
galF	0.708436	0.463989	0.635139
yraO	0.544742	0.514565	0.538895
yibQ	1.604825	1.366035	1.54624
speG	0.522194	0.41912	0.46561
yhaO	1.695556	1.248483	1.651859
yjbJ	1.120482	0.84756	1.075925
yecE	1.43503	1.140011	1.450963

ycbR	0.421026	0.329757	0.424909
ybfH	1.037931	0.859536	1.066609
atpI	1.255104	0.942176	1.32448
yagA	5.30651	3.944536	5.547174
yfcC	1.107613	1.016079	1.351241
pflA	1.643801	1.446813	1.90188
ygeI	1.141517	0.963278	1.272986
yjbM	0.91808	0.741948	1.045315
gadE	1.024057	4.069546	0.420057
yidQ	1.583354	7.80625	0.739508
lysC	0.260103	1.261636	0.146481
bacA	0.585556	2.697597	0.499475
fliS	0.267832	2.072914	0.253281
tatA	0.281196	1.13046	0.00735
dgkA	1.278223	5.835644	-0.061081
purE	0.639753	2.33964	0.146394
rlmB	1.033445	3.917263	0.162239
rhaS	0.302765	0.814959	0.026038
aspA	0.768043	2.211512	0.122953
tfaS	0.501992	1.473899	0.126524
yfaT	0.279939	0.878387	0.116501
nuoG	0.711523	1.983144	-0.651689
yqjI	0.33832	0.783334	-0.256767
ygfY	0.485651	0.94204	-0.213959
pstB	1.404614	2.771277	-0.537717
yaaU	0.799731	1.905225	-0.312717
ydaN	0.811935	1.767994	-0.378726
pykA	0.968182	2.276614	-0.519964
rbfA	1.623087	4.473698	-0.916614
yjgM	0.726368	2.249436	-0.410405
intD	0.526521	1.343755	-0.099204
hycE	0.045982	0.114703	-0.0035
bipA	0.391315	1.776638	-0.164111
ybgC	0.328528	1.362065	-0.076865
sucB	0.506769	1.821485	-0.284972
yehK	0.372484	1.192994	-0.164664
yjfZ	0.865726	2.88953	-0.243902
ydhX	0.470104	1.51556	-0.124388
pntB	0.985966	0.796805	-0.046968
envC	2.236974	1.642475	-0.038781
fliM	0.860016	0.625626	-0.095222
serB	0.743389	0.702794	-0.027757
rluD	0.744713	0.734187	-0.101058
cyaA	2.417425	2.151909	-0.379422
pps	0.596244	0.532337	-0.065572
uup	1.162781	1.032075	-0.2489
yheN	2.504005	2.124133	0.090061
yheM	1.861882	1.502522	0.122587
cyaY	2.377308	2.183061	0.282098
rplU	2.035378	1.484017	0.410006
yagX	1.242836	1.015425	0.307978
napD	0.941546	1.718369	-0.207872
hda	0.623815	1.126732	-0.097473
fimG	1.116463	1.924256	-0.166904
yebB	0.6042	0.874752	-0.135414
gntX	1.401784	2.14549	-0.447246
ydcR	0.303402	0.449096	-0.140884
yehC	0.716218	1.188868	-0.32391
crr	7.079117	7.545772	-2.95366
yoaD	0.750334	0.893023	-0.311087
cyoB	0.691559	0.89676	-0.328821

ygaM	1.075163	1.458965	-0.579902
pabA	0.914505	1.118448	-0.169454
phnK	0.849814	0.980102	-0.249169
oxyR	0.757095	0.801979	-0.506263
ygaH	0.646048	0.761781	-0.532034
ydfG	0.55965	0.715637	-0.445079
zapA	1.257021	1.536228	-0.808697
wza	0.232505	0.325329	-0.1605
bglB	0.787727	1.28282	-0.737736
yjdL	0.30522	0.468276	-0.242483
yehU	0.899359	1.489479	-0.765408
rcsA	0.182491	0.367631	-0.143085
ybgO	0.44324	0.785918	-0.354821
ygdQ	0.640533	0.395671	0.320107
ddpD	2.001742	1.333875	0.842002
atoA	0.931165	0.614282	0.40895
yqcD	0.774883	0.431848	0.316113
yfcF	1.784791	1.032346	0.606293
yzcX	0.830384	0.457354	0.202953
ydcY	1.283221	0.669027	0.349565
frvB	1.714577	1.087076	0.465714
yhbC	1.803067	1.478469	0.776725
fdx	1.098504	1.058183	0.658536
yjbD	0.849967	0.910358	0.457517
kefB	1.72924	1.361372	0.935521
fliI	1.311972	1.113146	0.837085
yzgL	1.272804	0.957579	0.892747
yfgD	0.890489	0.73536	0.648428
iscA	0.727858	0.558735	0.457755
ykfC	1.54256	1.151403	1.00267
aer	1.218858	0.750099	0.751544
fadA	0.477333	0.299104	0.288691
talB	0.844652	0.247688	0.485061
ygjJ	0.263102	0.061267	0.162569
epd	1.667936	0.804794	1.096107
hdeA	1.076146	0.518132	0.628702
torS	1.999542	0.879984	1.053394
yfcZ	0.684908	0.305837	0.382474
yjbB	1.339559	0.544615	0.737119
yagG	4.891785	1.809363	2.609415
visC	1.987095	0.820852	0.798351
modF	1.299685	0.528471	0.579078
afuC	3.406437	1.494345	1.498834
lar	1.216419	0.335068	0.492132
ppdD	0.607124	0.207063	0.251215
yidH	1.511505	0.316796	0.056174
ftsX	1.578413	0.368076	0.185485
nanT	0.56066	0.133602	0.048067
cyoA	0.662405	0.189633	0.137889
ymcE	0.88302	0.272895	0.17347
frc	1.178235	0.261658	0.237401
yghW	0.730342	0.09366	0.163852
betA	1.396374	0.179479	0.25387
fur	2.250942	0.8735	-0.087066
yegV	1.157981	0.417749	-0.139459
cyoD	1.642765	0.38304	-0.195004
uvrA	1.451469	0.353061	-0.169232
surE	1.682505	0.800222	0.077828
aslB	0.649982	0.33917	0.041987
xylH	2.422661	1.22722	0.167643
yiaL	0.664021	0.38175	0.092341

norV	0.669963	0.277004	0.092712
yagZ	1.237677	0.441054	0.094101
yccA	1.347089	0.441535	0.062585
yagI	2.537354	0.878122	0.094043
cutA	2.057979	0.065107	0.988583
ccmC	1.075375	0.078275	0.420338
ycjP	1.198779	0.215835	0.531572
yagF	3.164822	0.492304	1.118748
yjfJ	1.052013	-0.004611	0.298145
uxaC	0.945605	-0.033995	0.307513
fxsA	0.959482	-0.019203	0.356407
yaiO	1.707453	-0.137432	0.673876
thiF	1.112975	-0.165456	0.457556
frlD	1.148826	0.234151	0.89085
argE	0.830479	0.199643	0.746904
rhaB	1.151966	0.229241	1.020133
yjjN	1.416609	0.308586	1.213073
yliB	1.271846	0.255371	1.212006
zntA	1.986079	0.849435	1.810939
mdoD	1.209514	0.560026	1.223286
minE	1.856064	0.855151	1.85316
yebG	0.308587	0.120106	0.265871
norR	0.994141	0.340156	0.845282
ybhR	2.140836	0.948361	1.60864
ygeK	0.904566	0.463788	0.741255
fcl	0.822579	0.236915	1.004331
wcaD	0.426555	0.093861	0.51605
yahO	1.571031	0.389128	1.875253
ygcB	0.708456	0.14614	0.915691
minC	1.34538	0.278949	1.761704
yfcE	0.205159	0.060466	0.230402
ybcL	0.501635	0.147947	0.557342
crcB	0.793756	0.286129	0.991263
frvX	1.04855	0.364888	1.325881
aroM	0.359105	0.070652	0.519256
yfiF	0.758847	0.163748	1.207594
glcF	0.732706	0.017431	0.725615
hyfJ	0.241256	0.01215	0.237499
yhjB	0.211698	0.029408	0.232136
ahpF	0.641818	0.036195	0.742985
gntK	1.461817	0.056839	1.685786
ydaG	0.386914	-0.023389	0.372532
ypdB	1.022635	-0.04316	0.948923
frmR	1.006764	-0.063645	1.020676
potF	0.877803	-0.100955	0.800427
mntR	0.833422	-0.113009	0.852647
uhpC	1.542265	-0.183045	1.530019
yfjL	0.937802	-0.082088	0.722422
fucI	0.180761	1.492632	2.736877
cadC	0.203488	2.523558	4.833297
yoeE	0.036812	0.518548	0.980677
ilvL	0.052798	0.671629	1.334829
ydcX	0.031896	1.681833	3.147008
selB	0.069928	2.201327	4.058091
yhhK	0.038449	2.466057	4.431863
nfrA	0.029023	1.124763	2.017961
ytfQ	-0.004201	0.795769	1.466599
yhcG	0.2158	2.449885	4.28947
yjgX	0.085099	1.42655	2.516099
yigF	0.171076	2.338938	3.944825
yraJ	-0.069639	1.293196	2.615814

yeaR	-0.090134	1.987635	3.748025
yafK	0.033699	2.671293	5.428546
fldB	-0.108072	1.388591	2.104022
paaD	-0.069247	0.646858	1.019294
mqo	-0.013913	1.515183	2.367889
napC	0.008895	2.034944	2.864749
ygaD	-0.066633	2.190522	3.215781
yhcH	-0.347675	2.61067	4.517397
cusC	-0.86699	6.544938	11.496245
yadK	-0.147442	1.248722	2.228936
ypaA	-0.272772	2.298907	3.829887
shiA	-0.03907	0.37344	0.618345
dcp	-0.060977	0.670152	1.153086
yccX	-0.06705	0.918017	1.566977
ydeQ	-0.041716	0.781249	1.326474
yhdH	-0.067666	1.504529	2.574514
yejF	-0.133549	1.066332	2.002882
ysaB	-0.469185	2.134535	3.779853
flgB	-0.204694	0.888742	1.649298
glpC	-0.318146	1.558359	2.613065
ymfC	-0.395968	0.600463	1.415884
ynfM	-0.493718	0.826835	1.883485
yeeF	-0.413593	0.738898	1.682174
yfaA	-0.609817	1.32211	2.997002
narV	-0.458391	0.951835	2.214784
mrp	-0.167575	0.32575	0.735306
ydeK	-0.676845	1.159901	2.912239
pitA	-1.764343	2.918725	7.610098
yahC	-0.814637	1.744731	4.554435
sppA	-0.332872	0.654689	1.663531
tus	-0.282696	0.762888	1.65447
yfaL	-0.730889	1.730079	3.402282
ybeL	-0.211772	0.572513	1.157976
moeB	-0.646517	1.750302	3.562759
chiA	-0.694819	1.908279	3.746563
pfs	-0.207284	1.001257	1.951963
ycjG	-0.164807	0.957937	2.040313
kefF	-0.413063	2.057051	4.229109
atoS	-0.233886	1.243117	2.501616
yoaI	-0.347302	1.594949	3.376424
wzc	-0.290793	1.212902	2.536016
manX	-0.397896	1.488085	3.081293
arnT	-0.265718	1.748786	3.941641
tap	-0.204551	1.213811	2.824294
nlpC	-0.082971	0.570759	1.369558
ydfR	-0.037191	0.470523	1.013847
yfbO	-0.142356	1.44748	3.211211
ybgA	-0.124216	1.25081	2.714015
cysG	-0.072604	0.615598	1.285681
hybO	-0.213773	1.501586	3.873931
yehX	-0.06661	1.451472	3.414741
yohC	-0.009838	0.170507	0.424508
napF	-0.227973	0.40871	1.199182
fliH	-0.268324	0.469947	1.307179
aceA	-0.412041	0.781044	2.421924
ymgD	-0.19699	0.404447	1.208467
lipB	-0.219467	0.563788	1.594316
ycbV	-0.340196	0.804051	2.160293
garL	-0.331207	1.320409	3.13266
yjcD	-0.156841	0.632332	1.652452
ycbZ	-0.270677	1.00691	2.680722

gloA	-0.339398	0.81751	2.560757
selD	-0.268067	0.772075	2.545488
cynS	-0.541519	1.803187	5.280077
yrdA	-0.200682	0.704885	2.119848
mdtK	-0.178202	0.654515	1.912545
ybaJ	-0.084565	0.269374	0.833515
ymdC	-0.165797	0.495662	1.503187
nudG	-0.119388	0.818763	2.509358
aslA	-0.216358	0.921265	2.921114
flk	-0.192449	0.884195	2.617304
fixC	0.578397	1.222508	2.537549
yqhG	0.919603	2.009872	4.097248
nuoH	0.309269	0.683661	1.423398
ygbJ	0.792746	1.443141	3.203146
ivbL	0.703419	1.11175	2.431788
yfjN	0.645835	0.980982	2.247945
rsxA	1.040425	1.699709	3.809174
dcuD	1.159956	1.732035	3.764605
ybhO	0.830701	1.235551	2.593978
guaC	0.941785	2.457419	4.376171
yhjG	0.66303	1.651105	3.082796
rfaK	1.047265	2.146918	3.640795
yheT	0.728532	1.655711	2.963611
sthA	0.976529	2.304115	4.081185
truB	0.677243	1.541376	2.653479
ygcO	0.699516	1.594924	2.778176
adiY	0.424861	0.948343	1.606805
ybbY	0.324294	0.608765	1.159094
fhiA	0.749666	1.3671	2.611429
ylcE	0.179495	0.373043	0.695338
yaeI	1.15719	2.338143	4.60944
yncJ	0.578758	1.117546	2.161717
clcA	0.351142	0.706184	1.35728
ygfX	0.51303	1.812087	3.639447
yafT	0.382755	1.250717	2.530667
yqiB	0.354993	1.172297	2.326693
yhdV	0.666502	2.340004	4.835246
yiiM	0.088723	0.254392	0.543812
speD	0.188674	0.553649	1.180522
yggR	0.321072	1.878697	3.425746
idnT	0.197113	1.079695	1.875684
ybhI	0.483587	1.83926	3.50557
gltL	0.274026	1.154963	2.237089
exbB	0.547437	2.512362	4.692925
hsdR	0.134354	0.604907	1.113477
yeaN	0.059424	0.353429	0.695587
yeeE	0.195006	1.187835	2.347329
yrfD	0.363955	1.902996	3.64514
yeeU	0.299944	1.360572	2.786319
eutJ	0.664397	2.291429	4.006127
fdrA	0.516471	1.873882	3.280847
selA	0.947228	2.906361	5.277771
ompL	0.298181	0.909542	1.640195
ego	0.203297	0.652343	1.182714
mhpE	0.134551	0.450906	0.831216
htrG	0.54485	2.068318	3.390293
yicH	0.416811	0.885635	2.169735
caiD	0.887697	1.804565	4.658886
ssuE	0.72595	1.716106	4.553851
ybiN	0.239195	0.61411	1.615673
ypdI	0.471983	1.456822	3.675793

yiaJ	0.337868	0.869486	2.102943
galM	0.970608	2.463976	5.934846
yjeI	0.273578	0.736866	1.79889
yaiF	0.252693	0.69434	1.692799
cusS	0.431696	1.256042	3.028756
flgD	0.347722	0.695278	2.063571
ydcC	0.38194	1.170934	3.718812
yncN	0.140815	0.376518	1.214069
mltB	0.298194	1.032226	3.064009
yqiJ	0.245763	0.775151	2.243732
yfjD	0.699273	1.680276	5.115117
ynfF	0.395176	1.079534	3.159613
gspE	0.409486	3.235461	6.817404
agaS	0.174569	1.062599	2.192388
mngB	0.137354	1.517366	3.305994
sdaC	0.089036	1.782728	4.23334
yhbY	0.49133	3.263746	7.910816
rumA	0.180508	1.082147	2.702367
yjgH	0.258393	2.548977	6.040961
chbR	0.195878	1.493221	3.478411
yejH	0.135893	0.980536	2.267882
ybbK	0.308568	1.249886	3.213093
ydgG	0.109033	0.560424	1.433272
yncD	0.122194	0.574447	1.472942
hyfH	0.293743	1.350255	3.563652
glgB	0.115272	0.528622	1.405358
yegS	0.173183	0.640921	1.514066
aceK	0.250779	1.210148	2.801502
yjbH	0.2018	0.982984	2.313999
ybcD	0.324987	1.382092	3.198226
yidJ	0.187594	0.671396	1.48231
ydiU	0.354681	1.524976	3.367113
hisI	0.170015	1.479654	4.432462
speA	0.074881	0.558916	1.685046
yidE	0.250918	1.561581	4.465323
yfcO	0.097602	0.720304	2.054028
yfbH	0.214255	1.68127	4.75268
ydhW	0.053505	1.649978	5.707432
ymfP	0.198062	0.9538	3.107839
ybgP	0.20289	1.640529	5.326358
yeeP	0.10073	0.682782	2.256492
yhbT	0.122127	1.285915	4.252438
yhaV	0.037736	0.510212	1.624487
cynT	0.140152	0.884528	3.086205
fecR	0.152274	1.062175	3.745374
moaD	0.536391	1.516798	5.298592
metI	0.247253	0.744873	2.7019
leuL	0.36183	1.343727	4.652038
yaeR	0.191235	0.827181	3.091067
yadS	0.019579	2.156483	6.498046
moaE	-0.204477	2.236589	7.197935
yhdT	-0.06122	1.319017	4.054876
yeaK	-0.045874	0.727937	2.282428
ygdI	-0.000795	0.74558	2.030142
yjjA	1.308877	2.093597	5.866022
pspA	0.510515	0.721109	2.076945
ybfB	0.592401	0.801729	2.249746
glvG	0.26887	0.335919	0.969912
rbsD	0.38167	0.651315	1.683928
ybfM	0.662047	1.067262	2.621216
thiD	0.626955	0.929269	2.423396

mscL	1.056517	1.57787	4.055966
yfjJ	1.280854	1.409416	3.428843
lepA	1.021791	1.127651	2.754932
gntY	1.352672	1.397662	3.368046
ymfD	1.062317	1.007379	2.9796
truD	0.747724	0.758551	2.071108
hybA	0.622883	0.667351	1.794556
yhgE	0.394129	0.44559	1.17371
ycbJ	1.526141	1.840128	5.041206
ttdB	0.256474	0.296799	0.822744
ygfG	0.868921	0.906179	2.781387
yecO	0.115331	0.125592	0.370819
betI	0.553178	0.574348	1.829987
frvA	0.917047	0.802932	2.725706
fliZ	0.616928	0.48166	1.808321
malS	0.861759	0.835788	2.914473
fklB	1.162409	1.157001	4.188899
wbbI	0.400283	0.426364	1.518066
yhcO	0.405521	0.333523	1.342863
yhbO	1.316642	1.139586	4.638269
sfmH	0.678556	0.407337	1.899201
ppdC	0.929805	0.522659	2.514622
mak	0.634921	0.445823	1.895348
gcl	0.47029	0.328945	1.373145
ybaX	0.303415	0.439509	1.483735
dppD	0.592733	0.814472	3.002766
fucK	0.496476	0.838926	2.807932
menE	0.782781	1.238312	4.127591
yfdP	0.477339	0.838095	2.884195
ygiV	0.575696	0.911828	3.234824
yfaH	0.293218	0.481293	1.727381
yjgR	0.232712	0.396216	1.593247
yfjX	0.272388	0.53719	1.963466
yibJ	1.046072	1.86511	6.754905
napG	0.594536	0.682896	2.687642
rzoD	1.198266	1.475938	5.25596
yjeB	0.711973	0.795645	2.946801
ygcM	0.284391	0.30765	1.143641
yidK	0.898402	1.283988	3.931284
sodC	0.406509	0.576609	1.852567
ompW	0.736854	0.878894	2.96299
hyfD	1.287932	1.594168	5.090884
ybaY	0.645951	0.794345	3.45941
aroH	0.686976	0.744214	3.748682
mutL	1.550841	1.448747	6.654132
yhfS	0.671219	0.630885	2.944832
yihM	0.801274	0.843361	3.854293
cybC	0.380021	0.306598	1.42147
lacA	0.938047	0.680932	3.439278
bioF	0.799225	0.618427	3.166733
brnQ	1.683673	1.282504	6.543356
yiiL	0.632712	0.403091	2.151505
ycbL	0.341578	0.20606	1.131402
glgX	1.354542	0.937756	4.623798
alx	0.800391	0.46371	2.789661
yjdJ	0.706545	0.611249	3.420196
nudD	0.383013	0.280743	1.717177
hokC	0.445995	0.340809	2.031892
creC	0.808682	0.52414	3.333579
yihL	1.083203	0.653411	4.588272
sieB	0.803982	0.451742	3.461985

ygfQ	0.712211	0.422507	3.271802
sufA	0.598736	0.177042	1.866877
rnb	0.904364	0.352086	2.970106
fixA	0.712853	0.256361	2.331234
envR	0.618549	0.298516	2.166332
ygeW	0.700038	0.305722	2.527302
grxC	0.75181	0.377182	2.281938
csgD	0.469244	0.205942	1.44632
ygaR	0.384264	0.105319	1.589174
fdhE	0.924741	0.185207	3.483586
alkB	0.362643	0.12358	1.338996
yjiS	0.840945	0.342761	3.379731
yijD	0.682634	0.297672	3.497691
hyfE	0.538919	0.27115	2.599505
kdpF	0.44058	0.254217	2.304736
ydjF	0.601734	0.237664	2.679999
rsmB	-0.10069	0.430602	2.019455
nikB	-0.085901	0.327043	1.602127
gpmA	-0.131486	0.636581	3.194396
slyX	-0.090852	0.498395	2.490826
ycbB	-0.086737	0.62631	3.361469
ybeB	-0.056728	0.305292	1.667007
yoaH	-0.077052	0.262828	1.459733
hflX	-0.025991	0.31188	2.044477
pinQ	-0.029571	0.289144	1.948085
ygbI	-0.201491	0.309478	2.406471
yjgL	-0.247115	0.563063	3.58306
yfiB	0.179319	0.647505	2.880504
sbcC	0.130854	0.375942	1.757642
ybhK	0.205522	1.050274	4.797082
yfjV	0.102849	0.49299	2.069061
ybbP	0.088435	0.702274	3.547395
ycfJ	0.154637	0.760194	4.366551
rmf	0.229064	0.846261	4.907544
yedX	0.024793	0.47491	1.921518
yaiE	0.030209	0.610045	2.395683
ydbL	0.080282	0.810478	3.240715
yjiA	0.035114	0.589536	2.470943
yecC	-0.023368	0.802687	3.159841
yfhR	-0.009587	0.533558	2.165909
yegU	0.030391	0.6499	2.93585
yjfI	0.042279	0.735156	3.428758
cof	-0.001763	0.204395	0.888388
ybhJ	-0.061609	0.596756	2.599203
rhaT	-0.071799	0.556921	2.405833
rimJ	0.017724	0.460404	4.111418
yeaC	0.011801	0.257406	2.438944
rrmA	0.139871	0.34095	3.282619
yhbS	0.110256	0.319145	3.342557
yggW	0.15422	0.677441	4.589747
ycbX	0.079582	0.443228	3.23218
ydjO	0.098821	0.378086	2.890318
ygfH	0.163937	0.275177	1.25626
atoE	0.329687	0.685817	3.57202
yiiD	0.625481	1.111936	5.670056
mdlA	0.473145	0.928454	4.561322
yeeX	0.278226	0.544544	2.762262
ycgH	0.247542	0.363945	2.643753
araC	0.194471	0.293371	1.872893
sbmA	0.300383	0.609656	3.906716
eptA	0.096258	0.19003	1.202979

yebY	0.166686	0.302521	1.961084
yfcA	0.186029	0.400228	2.352822
phnF	0.448445	0.429693	3.113954
yggH	0.453007	0.473901	3.370762
yceF	0.353989	0.412339	3.696995
hycH	0.381741	0.488082	4.2077
ybhL	0.270118	0.395799	3.760346
hflD	0.554218	0.406537	5.028904
yedQ	0.166547	0.14997	1.534724
renD	-0.399723	0.996122	17.023569
ydhI	-0.10893	0.21706	4.488219
yegD	-0.025406	0.122728	2.037355
tyrB	-0.150602	0.371495	4.506477
ydjY	-0.382533	0.321645	5.955607
codB	-0.150926	0.092633	2.944373
fnr	-0.128608	0.012473	2.100571
ynfK	-0.494323	0.25839	4.595627
ybaE	-0.246256	0.185236	2.071121
yjjG	-0.074098	0.080106	0.886952
nrdI	-0.212697	0.252134	2.444291
ynaK	-0.194518	0.047562	1.773009
mviM	-0.475805	0.032875	4.384815
hyaA	0.140632	0.072311	1.610905
uvrB	0.220527	0.155509	2.50937
glcB	0.36748	0.03405	5.521705
glcG	0.182715	0.026426	2.637825
yjbA	0.310358	0.075338	3.272036
chbF	0.285331	0.092603	3.293083
yghT	0.14278	0.112588	2.609351
yeaM	0.01578	0.015379	0.299476
narZ	0.104919	0.106743	2.175027
yqeF	0.103279	0.252801	3.69017
yfjP	0.073257	0.13475	2.003481
ada	0.04402	0.274816	4.699043
ybaW	0.049676	0.181868	3.355882
yecD	0.039258	0.068022	1.543961
ynaE	0.047023	0.018406	1.899246
rihB	0.088613	0.033298	3.139456
yaiU	0.078038	0.074921	3.194288
trkG	0.111003	0.166031	5.877758
gsk	0.080419	-0.031401	5.85222
ldhA	-0.017917	0.039629	2.086059
ybeH	-0.064221	0.000818	2.961867
yfbP	-0.091325	-0.070839	3.039877
ynjE	-0.030474	-0.044348	1.451367
stfQ	0.016483	-0.090586	2.631581
kdgR	-0.003751	-0.038972	1.4133
sfmF	0.001892	-0.029515	0.491578
ynjD	0.038618	-0.140324	2.955004
macB	0.127761	-0.11736	2.361654
nrfD	0.065468	-0.023758	1.522855
yphE	-0.089564	-0.117694	1.550424
emrY	-0.027819	-0.142658	1.219191
endA	-0.731178	0.581409	2.713814
menF	-0.378568	0.302232	1.421186
citC	-0.44708	0.352409	1.673949
chbC	-0.768703	0.625793	3.055592
ydhA	-0.63398	0.440558	2.475546
ygjP	-0.208694	0.153045	0.800314
citT	-0.371911	0.246611	1.350235
pncA	-0.176612	0.115948	0.652118

hycC	-0.930454	0.64841	3.866929
uidA	-0.134543	0.085042	0.525381
paaG	-0.997758	0.656121	3.304989
ypeC	-0.61658	0.391222	2.012132
acrD	-0.914472	0.645277	3.064602
yoaC	-0.172052	0.076679	0.723056
hypF	-0.335635	0.158071	1.537398
flgI	-0.175085	0.056706	0.690231
pabB	-0.55688	0.197667	2.148826
pmrD	-0.584491	0.318425	2.373539
tdcF	-0.715588	0.184104	2.243314
slt	-0.427141	0.141008	1.346138
yeaQ	-0.741419	0.273738	2.511328
gmr	-0.438719	0.172828	1.586513
ydjQ	-0.357423	0.733768	3.195918
pspD	-0.208269	0.476503	2.073018
yaeF	-0.348568	0.890449	3.879214
yqjE	-0.351141	0.504838	2.808224
rspA	-0.221085	0.318985	1.579667
bglG	-0.594283	0.811238	4.110314
ypeA	-0.264402	0.308017	2.096107
nirB	-0.796654	0.847755	5.108229
ydeV	-0.514215	0.536829	2.195952
yfjQ	-0.619717	0.821947	3.176095
ydiA	-0.105836	0.139206	0.541385
livK	-0.517314	0.777835	3.257033
pheP	-0.353607	0.526545	2.127845
yncI	-0.303307	0.49403	1.727062
ybbM	-0.409168	0.76291	2.637228
hyaB	-0.450526	-0.002469	2.106969
ycaI	-0.933787	0.096312	5.612031
yfhD	-0.060793	-0.000643	0.383832
pepB	-0.220292	-0.038384	1.21942
uhpT	-0.485893	-0.095583	2.995232
pheA	-0.59915	0.190835	3.222094
ydcU	-0.803481	0.179583	4.216006
potC	-0.827306	0.254119	3.726805
ybaN	-0.603781	0.18629	2.766617
yebS	-0.891415	0.312151	5.919214
yeiW	-0.239344	0.089484	1.664824
ydiP	-0.933877	0.443875	5.583132
modC	-0.7413	0.548326	4.670755
ygeD	-0.330833	0.208926	1.716558
nrfA	-0.398141	0.201366	2.091399
yiaF	1.144365	0.330954	2.604539
dcm	1.114579	0.481459	2.527851
yibI	0.500573	0.187541	1.058843
yhhX	1.883684	0.628062	3.523236
yigB	0.602356	0.232219	1.139884
ychF	0.84679	0.307827	1.619293
yjcR	2.520795	0.691846	4.950608
mntH	0.772822	0.214562	1.572674
yjdK	1.081009	0.22041	2.151079
arpA	0.470373	0.110549	0.929229
ypdA	0.729114	0.175493	1.421361
malP	0.778073	-0.286447	1.806801
tdcA	0.369757	-0.120543	0.954084
ydcA	0.386639	-0.120062	1.013957
nupG	1.062053	-0.363269	3.33083
yajD	0.754562	-0.204749	2.678207
metR	0.827326	-0.150761	2.753697

argP	0.82343	-0.12204	2.806839
ykgM	1.260034	-0.227602	3.397331
gudX	1.014775	-0.115766	3.005456
paaE	0.634501	-0.053539	1.867793
yhjX	0.61106	0.012112	1.71013
alsA	1.355434	0.082384	3.693389
abrB	0.700154	0.009828	1.841127
sodA	1.853776	0.217541	4.935549
yieH	0.639027	0.070186	2.073877
ynaA	0.228938	0.006691	0.688169
yjcC	0.804467	0.174472	2.263882
gidA	1.658666	0.284016	4.602251
mdlB	1.130207	0.258469	2.945305
mioC	0.689149	0.071602	1.685019
hokA	1.2368	0.118373	2.964276
alr	1.163865	0.096691	2.821306
mcrA	1.096144	0.186854	2.557011
pck	1.14098	-0.037745	2.442844
ybeX	1.143625	-0.046543	2.296779
tsgA	0.657224	-0.042383	1.254756
ppc	0.695326	-0.106532	1.401264
hyaE	0.481704	-0.056394	0.906335
yhhM	0.845506	-0.097831	1.634456
yraK	0.984533	-0.088636	2.324765
abgT	1.29851	-0.311554	2.711324
mdtG	0.234788	-0.051905	0.506278
yihN	0.653815	-0.182403	1.250745
ygiN	1.44358	-0.289585	2.72852
ygjO	0.196337	-0.023714	0.301068
yjaB	1.529564	-0.153516	2.461844
nrdE	0.881675	-0.048829	1.294077
yfhB	0.682497	0.028613	1.002806
yjfC	0.739535	0.031108	1.121045
ugpE	2.254457	0.186002	3.862247
ygaU	1.484661	0.059923	2.665433
cheW	0.398219	-0.204138	0.594198
dgoK	1.682678	-0.619338	2.598666
pqiA	0.844109	-0.331181	1.448835
erfK	0.55533	-0.230533	0.986012
yqhA	0.300257	-0.079801	0.436927
yigL	0.971191	-0.26383	1.409699
ygiT	0.738813	-0.204347	1.300042
bcp	0.844302	-0.248334	1.416244
ygaC	1.002096	-0.208635	1.587557
rseC	1.182581	-0.404272	6.639774
paaJ	0.133595	-0.080963	0.891223
srlE	0.512289	-0.111861	4.21326
xylG	0.22737	-0.091167	1.706404
fic	0.384902	-0.14691	2.979383
mbhA	0.421379	-0.139552	3.410328
yfjU	0.3308	-0.261209	3.453698
yjjU	0.913567	-0.024966	3.510234
kbaY	0.329459	-0.038076	1.529528
nlpA	0.16657	-0.019848	0.806048
slp	0.284126	-0.023989	1.253673
leuC	0.419332	-0.02863	1.8165
yrdB	0.642122	-0.091437	2.679351
yobG	0.966388	-0.079124	5.124504
ybaK	0.269599	0.011826	1.486667
elaC	0.434669	0.026734	2.418594
intA	0.572407	0.025093	3.772473

yidA	0.213258	0.004924	1.56549
ygaY	0.231972	-0.025659	1.548523
yjiP	0.872979	-0.127744	5.739649
ilvB	0.244111	0.049866	1.520106
astB	0.383129	0.182326	2.525369
gspD	0.473315	0.210551	2.827606
ftn	0.345122	0.11442	2.077212
yafE	0.601878	0.255352	4.264755
nhoA	0.274899	-0.207666	1.021061
yjcF	0.737507	-0.651196	2.953837
yqiC	0.377149	-0.401592	1.490022
cysD	0.424557	-0.511597	1.995762
yiaV	0.318561	-0.334823	1.85937
ygdE	0.205557	-0.227768	1.197796
yegQ	0.265642	-0.209274	1.237462
ascG	0.216129	-0.122647	0.852124
ygiP	0.899815	-0.454558	3.463845
yphG	1.05178	-0.425242	3.824257
yodD	0.221448	-0.109353	1.034078
srlD	0.176473	-0.093577	0.517803
ade	1.36003	-0.87313	4.374964
rhtA	0.739629	-0.382257	2.471225
pspB	-0.008194	-1.156346	3.184318
yfeO	-0.058205	-0.78731	2.332786
ymdF	-0.033669	-1.379386	4.209447
ybbL	-0.061639	-0.576221	1.504568
yhhP	0.098313	-0.542713	1.843021
yggC	0.083232	-0.629602	2.056236
intQ	0.017697	-0.248273	0.907058
yjiM	0.183767	-0.603097	1.914214
ybjO	0.379027	-0.531699	2.982127
pnuC	0.114214	-0.159808	1.013331
dadA	0.260496	-0.272681	2.447287
yifB	0.257108	-0.380919	3.228979
cysN	0.32636	-0.555372	3.88391
ymbA	0.014691	-0.076868	0.476457
purU	0.066421	-0.253011	1.705745
yghF	0.047974	-0.124766	0.893018
ymfM	0.098757	-0.255935	1.493661
stpA	0.115066	-0.253089	1.522617
clpX	0.272324	-0.576136	2.442361
cobU	0.205397	-0.380308	1.506318
yjgK	0.244258	-0.387295	1.773274
caiF	0.101176	-0.359829	1.666931
gatD	0.275618	-1.172497	5.310177
nrfC	0.107444	-0.432688	2.253379
yohK	0.151441	-0.399264	1.703884
tpr	0.269747	-0.71891	3.439121
yjjQ	0.113716	-0.292058	1.342578
ygeV	-0.073099	-0.705119	3.943148
yqfA	-0.098091	-0.760703	3.559429
sgcB	0.729604	-0.56371	1.337782
galE	0.656324	-0.507149	1.198113
yjcE	0.780226	-0.509223	1.467073
yghK	1.255264	-0.918824	2.506948
ytjB	0.973672	-0.976579	2.090966
htpX	0.414616	-0.413321	0.864017
gudP	0.495122	-0.49463	1.09232
yjcO	0.941081	-0.826173	1.963453
ybcC	0.088907	-0.051026	0.215779
copA	0.861169	-0.598621	1.998976

yqiI	0.413156	-0.269038	0.97024
hisB	0.460467	-0.236952	0.961962
nrfG	0.0741	-0.084261	0.261659
ychN	0.205681	-0.162908	0.590216
rfaJ	0.778136	-0.619714	2.30792
yghG	1.163554	-0.901763	3.543776
creD	0.198714	-0.221995	0.554334
yfhL	0.451152	-0.412365	1.181526
potD	0.299222	-0.66688	2.086886
yfdY	0.108893	-0.217399	0.700034
yicN	0.244691	-0.494154	1.638967
nrfF	0.216	-0.386633	1.243917
yqaA	0.243992	-0.50353	1.485192
ygaF	0.727103	-1.481443	4.327728
ybfN	0.192051	-0.304879	1.125635
fecB	0.503075	-0.898676	3.12235
cspG	0.351395	-0.720484	1.739794
yobF	0.151369	-0.367187	0.761585
rhsD	0.179176	-0.514143	1.115861
ybaM	0.14639	-0.514181	1.087675
ypjM	0.579066	-2.186976	4.499282
aes	0.10526	-0.518275	1.129724
rnr	1.170422	-1.965617	3.801262
alpA	0.386307	-0.606241	1.334075
recX	0.374405	-0.546656	1.263254
wbbJ	0.54181	-0.717306	1.56729
degQ	0.317575	-0.696249	1.083166
ydiI	0.295139	-0.609312	0.979762
ycaK	0.265037	-0.633888	1.0598
alsB	-0.554775	1.160165	1.171663
entC	-0.839009	1.763497	1.705013
yjhV	-0.344432	0.801714	0.746715
mdtI	-0.38031	0.974176	0.870605
yabI	-0.935841	2.21929	2.331517
dos	-0.367451	1.019903	1.08621
ynfE	-1.113721	2.12659	2.233119
yfbN	-0.401214	0.735184	0.809773
ycjQ	-0.290152	0.518497	0.578138
sbcB	-1.021832	2.061848	2.300187
ycfT	-0.389035	0.77425	0.872581
betB	-1.134397	2.196455	2.484045
argT	-0.66134	2.267922	1.944897
ytfF	-0.343734	1.045646	0.943163
hycI	-0.208307	0.629172	0.574836
gcvT	-0.358097	1.160282	0.94918
fhuD	-0.403208	1.229476	0.992036
clcB	-0.21777	0.361222	0.476602
umuD	-0.498919	0.87461	1.159261
melB	-0.342273	0.739164	0.94954
ylbF	-0.537401	1.1404	1.391624
fsaB	-1.322711	2.550087	3.393978
ycjS	-0.733923	1.413914	1.841045
yejO	-1.036461	1.327807	2.070992
flgE	-0.607334	0.805133	1.294197
sfmA	-0.598043	0.919305	1.479092
napB	-0.746143	1.172515	1.838524
rfbX	-0.753095	1.180972	1.739473
ylbA	-0.800051	1.228636	1.854822
ypdF	-0.303568	0.447252	0.685747
cheY	-0.545509	0.685865	0.91162
yjeP	-0.542717	0.645938	0.975112

lysA	-0.670148	0.813188	1.199193
yciH	-0.899214	1.058114	2.256561
ydaT	-0.508805	0.719019	1.363675
nhaR	-0.698895	1.453528	2.137569
flgJ	-0.645096	1.204755	1.856184
yebR	-0.813413	1.544412	2.761619
ypdD	-0.59077	1.149615	2.153875
yncH	-0.917027	1.572706	3.010079
ycbT	-0.32892	0.587106	1.024337
kdpC	-0.805975	1.384002	2.333394
bcsZ	-0.135185	0.525672	0.564918
citD	-0.185532	0.78471	0.804003
hipB	-0.216738	0.841925	0.963339
yaaA	-0.488643	2.564381	2.932491
btuF	-0.561313	3.118315	3.767546
flgC	-0.295776	1.424158	1.701058
uxaB	-0.151135	0.679992	0.830771
yhiF	-0.523519	1.347206	1.855698
yehT	-0.632474	1.965148	2.617037
kefG	-0.221697	0.715894	0.924342
ygcE	-0.336669	1.188061	1.577885
napA	-0.756542	1.92252	2.241597
lysR	-0.264495	0.77272	0.888423
lsrG	-0.474787	1.492432	1.777134
ptsA	-0.826185	2.290086	2.857273
yahF	-1.132052	3.392513	4.253129
rihC	-0.245677	1.024836	1.433467
yfaP	-0.28437	1.691215	2.250444
caiB	-0.398167	2.15835	3.014567
yqeJ	-0.13548	0.779298	1.072326
rbsB	-0.821679	3.507461	5.483146
glpT	-0.283248	1.151863	1.793505
sufS	-0.233545	1.089983	1.714871
yfeX	-0.383508	2.210531	3.276785
adiA	-0.54096	1.410927	2.153922
fucU	-0.392605	1.229865	1.901093
trmA	-0.297134	0.907204	1.453378
eda	-0.736109	1.639006	2.823935
ycaR	-0.661858	1.588834	2.744594
yfcJ	-0.246995	0.649941	1.103195
tyrP	-0.391594	1.101943	1.879395
yhdW	-0.470539	1.497313	2.778862
ydeP	-0.319952	0.9085	1.633551
gst	-0.135327	0.418741	0.73017
yehW	-0.245117	0.870354	1.503531
pdxA	-0.510088	1.630097	2.700071
yafQ	-0.18562	0.60242	1.014112
yqcE	-0.627444	0.568768	1.130413
ycbF	-1.45056	1.468368	2.889384
yeaT	-0.376639	0.398469	0.746758
cspF	-0.458131	0.307567	0.668617
ycbQ	-0.990572	0.607749	1.350728
ydgT	-1.304584	1.084047	2.088933
yrbA	-0.800414	0.627631	1.273227
ybdA	-0.793666	0.643608	1.086315
yjeH	-1.076791	0.570318	1.685634
lysP	-1.263165	0.600226	1.918414
hisA	-0.922005	0.32917	1.27136
ydhC	-1.095089	0.442989	1.536815
citF	-1.362113	0.52107	1.63813
prkB	-0.615567	0.655181	2.093698

elaA	-0.497074	0.500401	1.557484
ycaL	-0.867101	0.696333	2.673792
chbA	-0.931004	1.31299	3.655996
sufB	-0.163733	0.214964	0.616824
yjeT	-0.657483	0.851744	2.783425
artM	-0.738109	0.993761	3.07203
yzfA	-0.470815	0.410601	1.276781
metE	-0.341832	0.338636	0.895669
relE	-1.189727	1.341572	3.711378
wrbA	-0.702566	0.729987	2.02346
grxB	-0.90939	1.181106	2.805278
yedL	-0.752447	1.019184	2.382937
yfbM	-0.521493	0.632328	1.485482
yohG	-0.989266	1.210901	2.881924
osmE	-0.800022	0.613581	1.589302
znuA	-0.708366	0.501197	1.336883
dacD	-0.198504	0.136351	0.364889
maoC	-0.48911	0.430709	1.112299
ydeU	-0.906536	0.543659	1.942428
yibH	-0.698729	0.416102	1.405512
fhuE	-0.280634	0.166718	0.567023
allA	-0.584485	0.369345	1.343564
yeiL	-0.232834	0.15699	0.509968
ydhF	-1.24304	0.943628	2.763892
flhE	-0.58815	0.815182	0.846882
tyrR	-0.419748	0.521113	0.563175
yicO	-0.824808	0.871022	0.801395
yfcU	-0.403927	0.491434	0.409164
yeiB	-0.994855	1.408784	1.232033
citE	-1.018481	1.316889	1.16575
yraI	-0.593164	0.820594	0.548638
ycaN	-0.766008	1.117754	0.839391
wcaF	-0.687314	0.94168	0.485238
flgL	-0.435352	0.560805	0.350563
agaV	-0.964929	1.199014	0.716938
yfjT	-0.382949	0.456041	0.249843
ybeF	-0.622009	0.672972	0.389545
fliF	-0.945001	1.667355	0.824715
ykgA	-0.685734	1.325379	0.698153
ypdG	-0.624857	1.148027	0.867822
ucpA	-0.503832	0.958376	0.704325
hisC	-0.433973	1.003013	0.639057
yfaW	-0.561039	1.344533	1.009342
ynaI	-0.279769	0.619241	0.440412
yecI	-0.974067	-0.494358	1.474041
modB	-1.835174	-0.620369	2.610558
phoH	-0.49077	-0.166577	0.745086
ydfX	-1.318991	-0.532443	1.964601
rstB	-0.685475	-0.441741	0.981722
yjgA	-1.458889	-0.725168	1.568481
yedA	-0.879236	-0.459951	0.977785
yneI	-1.036688	-0.466623	1.147064
ydiK	-0.751099	-0.145969	0.875719
ynbA	-0.439932	-0.086378	0.555363
motA	-0.434248	-0.093677	0.476438
yegE	-0.7373	-0.147459	0.764286
crl	-0.202156	-0.044088	0.21302
sprT	-1.203349	-0.315796	1.272282
narJ	-0.888683	-0.162895	0.83545
yoaG	-0.652732	-0.196305	0.350307
cysQ	-1.075969	-0.33106	0.665507

yccT	-0.46968	-0.142109	0.30632
slyD	-0.307251	-0.111322	0.233012
cysA	-1.261772	-0.444531	1.09222
ydhJ	-1.458563	-0.681746	1.081513
ydaQ	-1.41976	0.024106	0.846418
otsA	-0.829042	-0.017345	0.433966
yahK	-1.663743	-0.030413	0.838569
uvrC	-0.714149	0.025893	0.27205
yeaS	-0.784214	0.16834	0.96605
ybfG	-0.704379	0.097391	0.755474
ybdH	-0.521218	0.004864	0.486774
ybaQ	-1.30714	0.010344	1.272462
ydgK	-0.777994	0.095825	0.520061
cysC	-0.880824	0.100666	0.653457
ydiO	-0.70593	0.079993	0.575502
apt	-1.729378	-0.035055	1.275075
ydeO	-0.703294	-0.10666	1.964388
artJ	-0.757765	-0.125908	2.198675
rhsE	-0.958643	-0.154588	2.578302
yjgW	-0.327917	-0.052591	0.80567
yedM	-0.18098	-0.009028	0.617995
ydaE	-0.173937	-0.005857	0.547939
yobD	-0.472206	0.048117	1.733027
ycfQ	-0.227873	-0.046328	0.738047
yebW	-0.294289	-0.050434	1.131335
chaB	-0.460797	0.101854	1.298461
ynfB	-0.93267	0.130938	2.488775
feaB	-1.015629	0.054776	2.571588
yaeB	-0.812324	-0.333125	2.277887
ygfS	-0.601842	-0.241137	1.93611
iaaA	-0.666893	-0.270531	2.005752
yfdE	-0.30821	-0.164635	0.888243
malI	-0.47017	-0.279185	1.268546
ycgG	-0.542001	-0.357648	1.423796
astA	-0.709276	-0.526595	2.501634
malX	-0.640599	-0.448757	2.433296
yjfN	-0.26655	-0.257519	1.159841
ypfJ	-0.366786	-0.229077	1.557591
yaaJ	-0.586322	-0.229248	1.195269
yqfB	-0.259186	-0.114767	0.500276
yedP	-0.813232	-0.460135	1.805058
yraR	-0.406437	-0.221076	0.820117
yniA	-1.971	-0.313386	3.368749
idnD	-0.3734	-0.109853	0.788754
ydhO	-0.758019	-0.225808	1.758072
ydgR	-0.642314	-0.147091	1.353049
ymgA	-1.83998	-0.345814	3.870338
ytfM	-0.419932	0.110302	0.937836
yneF	-1.070506	0.340214	2.578587
ygeR	-1.225814	0.306941	3.035014
gadC	-1.395666	0.228888	3.331327
yjhD	-0.395087	0.123296	0.820909
ydjL	-1.059196	0.356456	2.330818
fucR	-1.238224	0.559344	3.52795
ompG	-0.485484	0.199339	1.168313
ydcO	-0.94568	0.507134	2.337054
yfdZ	-0.529962	0.270408	1.19232
ygjE	-0.26966	0.032372	0.440631
spy	-0.434898	0.030933	0.675749
ybdD	-1.341898	0.010371	1.940697
narK	-1.275672	-0.003728	1.735078

hypD	-0.633071	0.002992	1.243868
ycjD	-0.969551	-0.034889	2.014068
ydhK	-0.896912	0.16379	1.875339
ycdX	-0.567768	0.053092	1.057351
yeaJ	-0.577431	0.076386	1.12341
yniD	-0.652169	0.184293	1.114982
ykfG	-0.144972	-0.308243	0.964303
znuB	-0.476053	-0.803712	2.43352
yggE	-0.496185	-0.889526	2.424379
yeaV	-0.867522	-0.869584	3.015832
yqcC	-0.527729	-0.684957	2.173922
modA	-0.729199	-1.67725	3.515563
ybhG	-0.385521	-0.694713	1.682568
cynR	-0.293099	-0.468777	1.155732
glpK	-0.343558	-1.250309	2.556794
yphH	-0.176854	-0.643051	1.350146
pnp	-0.157828	-0.516932	1.41812
mipA	-0.397355	-1.32047	3.407877
glnK	-0.409705	-1.664555	4.149072
ydiN	-0.29121	-0.497674	2.096872
proY	-0.378582	-0.58918	2.485467
ypfN	-0.62006	-0.863608	3.278934
yfaZ	-0.073584	-0.105587	0.578115
narL	-0.351193	-0.557443	2.799919
yfcN	-0.25052	-0.561446	2.849279
lplA	-0.234703	-0.223639	2.163362
ccmH	-0.352149	-0.21666	2.518213
pin	-0.381909	-0.277941	2.265479
yfjM	-0.695901	-0.40443	3.869899
gabP	-0.358305	-0.339619	2.286764
kdgK	-0.328404	-0.571552	0.721035
yeeW	-0.416237	-0.740672	1.002211
ydiL	-0.472812	-0.828069	1.125849
ydfP	-0.197939	-0.614085	0.986854
ycdY	-0.166125	-0.381597	0.625675
yjhS	-0.359998	-0.622858	1.144
yfbR	-0.883014	-1.494685	2.89421
clpP	-0.956436	-1.054199	2.083185
yciF	-0.867801	-1.068483	2.036054
ybjK	-0.407487	-0.408036	0.742174
ychQ	-1.369545	-1.263581	2.281608
amiB	-0.524656	-0.416255	1.083307
rtcA	-0.567885	-0.427984	1.209586
ydiM	-1.537193	-1.596946	4.314069
priC	-0.68199	-0.643058	1.881047
sapA	-1.037822	-0.850651	2.906164
ymfQ	-0.12191	-0.152439	0.359932
yedR	-0.187919	-1.170327	1.474953
moaC	0.061273	-0.744908	1.771128
yfaV	0.003223	-0.381934	0.81887
yceA	0.002201	-0.100993	0.215226
paaK	0.03515	-1.19862	2.674537
ynfP	-0.0036	-0.629983	1.288674
ynfH	-0.049688	-0.667516	1.449937
ygeM	-0.026841	-0.427535	0.739065
yodC	-0.017391	-0.357091	0.644762
ycaC	-0.027539	-0.235941	0.394773
ydfJ	-0.140277	-1.122515	1.9451
mfd	0.025174	-0.405439	0.750004
glnL	0.092782	-0.669031	1.223308
yhjV	-0.025707	-1.031141	1.637069

ung	0.025714	-1.256381	1.932306
nrdD	0.245236	-2.276713	3.603559
yhhN	0.151543	-1.537772	2.539978
yibA	0.079062	-0.517953	0.641216
iap	0.151173	-1.362744	1.490581
gabT	0.529175	-1.79186	2.727241
tiaE	0.343009	-1.353207	2.070215
hmp	0.036126	-0.161082	0.265604
yaiY	0.094947	-0.724723	1.001411
alsE	0.10087	-0.819819	1.175191
yjhA	0.138479	-0.791875	1.143451
sdaA	0.027264	-0.747535	1.016601
uraA	0.359105	-0.262159	0.332251
bcsC	0.703669	-0.570505	0.753146
yibF	0.836544	-0.500922	0.723917
gltF	0.670509	-0.338382	0.610384
nrfB	1.365215	-0.651402	1.106125
pflC	0.751819	-0.631259	1.012958
malM	0.940466	-0.695551	1.407647
secB	1.261565	-0.902774	1.458306
yjfL	0.080926	-0.05724	0.100102
acs	0.270698	-0.163175	0.334717
yggV	1.810301	-1.122953	2.215644
glvB	1.445747	-0.868452	1.619693
mcrC	1.362696	-0.87022	1.541677
yjbL	0.819446	-0.406343	0.934477
citX	0.424338	-0.206094	0.438725
ygfU	1.84749	-0.768768	1.770175
sseA	0.829198	-0.23823	0.93147
dsdC	1.358284	-0.485638	1.574543
yadG	0.373024	-0.077888	0.250954
stfE	0.542667	-0.177022	0.426937
zur	1.667276	-0.441094	1.233035
wzzE	1.618754	-0.566417	1.042888
manA	1.254766	-0.446542	0.793424
ygiF	1.10358	-0.439299	0.738556
ykgL	1.778549	-0.542095	0.944766
dtd	1.07739	-0.514563	0.55381
yliI	0.493526	-0.279709	0.322071
yjaH	0.468535	-0.555433	0.809735
frwD	0.434389	-0.49884	0.850491
yiiX	0.825058	-1.402393	1.597776
yeeZ	0.150264	-0.267502	0.378342
fecE	0.775289	-1.495744	1.927008
argH	0.839186	-1.728765	2.2254
yiiU	0.897516	-1.082439	1.224184
ygaQ	0.971518	-1.433273	1.503959
livG	1.341547	-2.321851	2.053138
yedE	0.707394	-1.434222	1.199591
glnQ	0.101447	-0.281746	0.261624
yncM	0.346431	-0.894546	0.939863
yhfT	0.142732	-0.559481	0.462627
ruvA	1.914107	-2.322792	1.635974
ydfH	0.540565	-0.55399	0.50079
thiH	0.811142	-0.639164	0.471879
yacH	0.439581	-0.401724	0.276801
rfe	0.747645	-0.888932	0.243873
rob	0.631982	-0.773377	0.277564
yhiP	0.922539	-1.29711	0.55369
yihX	0.91649	-1.34576	0.438223
zraS	1.382581	-1.229471	0.255628

yqiA	1.379676	-1.244281	0.540069
yebC	0.732357	-1.038153	0.062479
yqaE	1.216356	-1.448578	0.151485
pepT	0.537299	-1.274954	0.235153
hyuA	0.269222	-0.681042	0.101961
yjiR	0.601691	-1.468955	0.113046
ybiS	0.536392	-1.499821	0.133023
ompX	0.426764	-1.528913	0.275396
ydbK	0.37925	-0.798133	0.26884
yliK	0.645705	-1.101598	0.276811
sufI	0.438812	-0.764297	0.385491
dmsB	0.940121	-1.946363	0.923955
yeiQ	0.731421	-1.78162	0.812624
ppiA	-0.871762	0.972812	-0.010561
ybeD	-0.582908	0.525618	0.021908
ydeT	-1.105255	1.081148	0.021538
fliT	-0.533922	0.518048	0.024881
yigA	-0.453416	0.289906	0.010788
yjcZ	-0.56296	0.402605	0.043658
ydjK	-0.906265	0.626584	0.088017
chpS	-1.070295	0.835214	0.06848
asnB	-0.780679	0.589914	0.062635
ymfE	-0.46407	0.379864	0.015355
rpiA	-0.286731	0.21615	0.102144
leuB	-0.978768	0.883636	0.428171
mlrA	-0.306645	0.241977	0.151292
creA	-1.083974	1.794452	0.388139
torT	-0.503765	0.761935	0.290642
exuR	-0.315169	0.487248	0.150181
cusA	-0.83398	0.778575	0.217297
metH	-0.330749	0.402899	0.065237
yeaU	-0.900717	1.028346	0.221125
wcaE	-0.448612	0.536917	0.188276
leuA	-1.308283	1.969548	0.054071
yaiV	-0.241171	0.382257	0.038297
yehI	-1.225837	0.554221	-0.22944
yejK	-1.934673	0.985206	-0.514243
hybG	-0.518754	0.322823	-0.067097
rsxG	-0.550043	0.296027	-0.051281
yohO	-0.97769	0.714183	-0.102155
yfeS	-0.599466	0.429774	-0.161596
ynbD	-1.462687	0.609975	-0.099463
agaW	-1.655656	0.551858	-0.154796
mglB	-1.018454	0.24354	-0.165252
hcaT	-0.37429	0.101862	-0.066026
yoaE	-1.152488	0.486227	0.393035
ydgC	-1.274225	0.46308	0.313902
aaeR	-0.61138	0.246835	0.169649
cvpA	-1.02949	0.536576	0.238188
yeaO	-0.550234	0.279259	0.166007
ychA	-1.234202	0.650965	0.39744
gcvH	-1.09903	0.440737	0.162172
pheL	-0.352017	0.081828	0.159878
hisP	-1.017349	0.416629	0.599301
ilvM	-0.238492	0.083841	0.150135
cld	-0.442532	0.210237	0.223986
rfbD	-1.105104	0.499201	1.146314
hcaB	-1.561107	0.878439	1.558448
hypB	-0.255613	0.086143	0.204448
ygdD	-0.666027	0.579099	0.712526
ygaX	-0.908331	0.646089	0.88917

ddg	-0.971484	0.783718	0.687534
ylbG	-0.743573	0.602573	0.600611
yddE	-0.73156	0.441928	0.503041
uspF	-0.935246	0.518503	0.665603
sapB	-0.617892	3.287908	-3.683641
yceJ	-0.035626	0.257437	-0.276307
ycjX	-0.123862	1.381793	-1.527479
dcuR	-0.035566	0.717206	-0.783221
yieG	-0.141052	1.479066	-2.055687
ydiY	-0.096319	0.515947	-0.648049
sgrR	-0.11286	1.036573	-1.002941
yliC	-0.096785	1.343138	-1.29722
yafS	-0.025542	1.213752	-1.086903
yoeF	-0.008883	0.134268	-0.116566
panD	0.069573	2.279396	-2.168342
fimC	-0.743305	1.803395	-1.23831
pyrD	-0.385373	0.961189	-0.671482
deaD	-0.999861	2.704548	-2.058249
gloB	-0.394126	1.088747	-0.826432
yoaF	-0.063929	0.551132	-0.428151
frlC	-0.298261	1.676432	-1.177024
ybdR	-0.215018	1.201829	-0.9638
yfdQ	-0.054212	0.267636	-0.206021
yaeQ	-0.41118	1.315078	-1.330254
yhbP	-0.230874	0.780684	-0.661252
cfa	-0.585155	1.83244	-1.67226
mprA	-0.623966	2.109761	-1.888397
ydgJ	-0.071687	0.310878	-0.277581
ycbC	-0.136781	0.651875	-0.562953
nrdH	-0.246511	0.851204	-0.39868
ychJ	-0.377505	1.320037	-0.652838
fimI	-0.43804	2.080885	-0.891043
yfcR	-0.205233	0.871201	-0.412546
fliR	-0.362616	1.453591	-0.831023
pabC	-0.776067	4.802498	-2.401578
rpiR	-0.13442	0.832163	-0.498148
sapD	-0.921415	3.879714	-1.227162
nagE	-0.190771	0.996088	-0.3536
yhfG	-0.625225	2.067837	-0.652776
ygfA	-0.217052	2.639084	-0.673297
ybjG	-0.103743	1.414284	-0.431997
yqhC	-0.169589	1.141299	-0.28815
yciS	-0.185827	1.597821	-0.653064
php	0.108308	1.256855	-0.437911
prfC	0.271522	2.22838	-0.828878
gspA	0.14191	1.623927	-0.661043
treC	0.493534	2.906747	-1.133485
metL	-0.024126	2.024184	-0.491026
ybcK	0.079131	2.336146	-0.699847
recD	0.193054	1.401531	-0.403398
sfsB	0.229312	1.94824	-0.555953
pspE	0.024213	0.320087	-0.070449
yejL	0.530554	2.46259	-0.584418
pbpG	0.285293	1.140429	-0.383186
yccK	0.003034	0.966806	-0.660426
msrA	0.02307	0.989092	-0.662786
cpxA	0.023099	3.205364	-1.908684
dcd	0.090402	3.502452	-1.574207
rpsT	0.07481	2.451355	-1.271815
yegI	-0.012866	0.401	-0.197926
yagV	0.150489	1.309425	-0.726518

gcvA	1.147978	2.209022	-1.437992
malQ	0.961549	1.915904	-1.227368
yihU	0.81034	1.442319	-1.055022
cytR	0.476959	0.995737	-0.68875
spr	1.919383	4.283311	-3.186609
cyoE	0.811696	1.647237	-1.26806
yafU	0.777275	1.593405	-1.164284
ygaZ	0.729076	2.071501	-1.393385
hisJ	0.790088	2.14151	-1.33691
ygfB	0.556621	1.30347	-0.770726
sgcQ	0.208847	0.502364	-0.313461
ybjN	0.36978	0.83226	-0.465203
yfiH	0.266436	0.975614	-0.587886
rnd	0.141105	0.477812	-0.297712
pyrL	0.287029	1.057834	-0.703746
ybhH	0.167824	0.647514	-0.355131
ygiC	0.416146	1.30542	-0.597842
yheL	0.354217	1.333472	-1.203197
ldcC	0.445363	2.060809	-1.7902
exoX	0.109076	0.808741	-0.674971
yfbJ	0.35111	1.731418	-1.160645
exbD	0.343557	1.572812	-1.160044
ygdR	0.280896	1.424619	-1.10225
ppk	0.566154	1.91426	-1.961092
dgoR	0.299376	0.817559	-0.966091
yaiS	0.156944	0.455895	-0.505694
mngR	0.285681	0.748116	-0.703367
abgB	0.331734	0.894492	-0.763782
yibN	1.312895	3.131521	-2.711756
yciB	0.598428	0.906056	-0.980135
yfiR	0.915729	1.163037	-1.060424
usg	1.153445	1.428788	-1.480417
glpD	0.568354	0.751051	-0.756135
speB	0.639154	1.015645	-0.913335
ykgH	0.636044	0.967013	-0.795775
poxA	0.344895	2.073631	-2.472554
rpmH	0.163329	1.413742	-1.566218
exo	0.19888	1.259597	-1.415774
ppx	0.551248	1.533178	-2.202755
ymjB	0.56339	1.531814	-2.221637
yfdH	0.482691	1.613293	-2.688416
btuB	0.229815	1.961117	-2.700349
ygbT	0.149914	0.722877	-1.052204
fabF	0.611281	2.530882	-3.626739
ygdK	0.094929	0.493646	-0.6781
nusB	1.240866	1.48687	-2.040213
yhaL	0.634482	1.258919	-1.491284
fis	2.345375	4.651232	-5.73476
yhhT	1.056917	1.939627	-2.481778
basS	0.76617	1.217756	-1.975322
basR	0.58087	0.84643	-1.36618
rhoL	0.393555	0.574551	-0.878321
yeaD	0.155002	0.249075	-0.35704
pflB	1.463459	2.786167	-4.242902
glmM	1.272297	1.538112	-2.87035
ycaO	0.899251	0.781048	-1.928247
tldD	0.809753	0.742878	-1.859443
gadW	0.426867	0.397138	-0.871824
ldcA	1.188382	1.196568	-2.471233
ybcV	0.413666	0.608403	-1.221905
ygeN	0.149398	0.279669	-0.557523

ygcI	0.135939	0.27175	-0.478132
yeiM	0.247981	0.482712	-1.124529
yhaI	0.135217	0.318706	-0.657129
ybcS	0.146517	0.472175	-0.973788
pmbA	0.17942	0.546416	-1.135512
rpmJ	0.266972	1.778643	-4.18965
yqgC	0.093145	0.549935	-1.183521
cdh	0.143115	0.798968	-1.757184
yicL	0.295918	1.389374	-3.172454
torI	0.071794	0.469899	-0.956457
dppB	0.610863	1.222567	-3.459661
gph	0.302371	0.592419	-1.853611
yfcD	0.155149	0.47704	-1.505251
galS	0.305432	0.855467	-2.800334
acrF	0.100742	0.211547	-0.761336
yaiX	0.276911	0.55576	-1.906217
fecA	0.184861	0.548888	-1.463726
yqjA	0.184172	0.625779	-1.708386
yfgH	0.097523	0.382219	-1.048863
ycfM	0.430339	1.809355	-5.029717
ycaP	0.025493	0.469992	-1.134559
yfgM	0.025578	0.284183	-0.846899
trpR	0.045081	0.32246	-0.885967
ycjU	-0.153507	0.937581	-2.452367
rpmE	-0.073122	1.012199	-2.611523
gor	-0.164784	0.590991	-0.956151
ybeA	-0.040061	0.178933	-0.272441
ubiH	-0.329082	1.096003	-1.65468
ycdS	-0.737509	2.263794	-3.304692
yiaK	-0.108518	0.430672	-0.805244
rnk	-0.309889	1.208665	-2.135731
fdhD	-0.164484	0.514336	-0.947142
emrB	-0.176358	0.582443	-1.092346
yfgF	-0.07667	0.28606	-0.609878
rsuA	-0.346785	1.421446	-2.889628
ybcJ	-0.412463	0.860356	-1.576853
rhtB	-0.176827	0.356367	-0.662346
bglX	-0.387383	0.720575	-1.403307
yihO	-0.465507	0.955078	-1.542944
rfbA	-0.390393	0.882336	-1.392918
yihG	-0.05684	0.910765	-1.783847
nfi	-0.05498	0.391949	-0.674783
pykF	-0.037095	0.87378	-1.509047
lysU	0.055547	0.793368	-1.386985
ybiJ	0.026291	1.367682	-2.01698
gutQ	0.030728	1.894629	-2.884875
thrB	-0.483691	0.393457	-1.541038
mhpA	-0.286938	0.244804	-1.024082
yfbS	-0.760182	0.706769	-2.395637
yehM	-0.354551	0.358589	-1.190684
yjjZ	-0.462413	0.522696	-1.563452
essD	-0.240896	0.191995	-0.693657
yejA	-0.497357	0.415496	-1.46052
yafM	-0.705852	0.523709	-1.570148
yjaG	-1.158989	0.872638	-2.728771
proW	-0.462649	0.350193	-1.156041
smf	-0.812637	0.934407	-1.944667
ybfP	-0.463008	0.667686	-1.383414
ybaD	-0.778069	0.918088	-2.388005
seqA	-1.373546	1.894822	-4.567141
ulaG	-0.44305	0.884358	-2.552861

tauB	-0.224203	0.414962	-1.166184
ynfD	-0.327572	0.580424	-1.645275
pcnB	-0.743205	1.644917	-4.894827
mdoC	-0.452516	0.684653	-1.971019
ligT	-0.746845	1.10035	-4.060967
smg	-0.583255	0.808887	-2.780927
ydhP	-0.681778	1.859489	-0.48693
hofC	-0.676038	1.617697	-0.436638
creB	-0.279807	0.628688	-0.200284
djlC	-0.385256	0.858604	-0.113548
rbsC	-0.445392	1.089786	-0.136388
yeiC	-0.463604	1.120511	-0.109563
btuD	-0.535012	1.236983	-0.24428
yebQ	-0.593822	1.310063	-0.273454
aceF	-0.797079	3.235541	-0.08603
cadA	-0.869375	2.822421	-0.129008
ydiF	-0.329657	1.098885	-0.12584
yhcD	-0.418017	1.32008	-0.19398
ydaY	-0.177011	0.631197	-0.105285
pcm	-0.299419	0.505877	-0.073369
purT	-0.830869	1.270293	-0.477905
fliQ	-0.63193	1.092381	-0.355434
yraH	-0.206726	0.373743	-0.103047
yfaD	-0.726668	0.785152	-0.365178
ydiH	-0.405463	0.455754	-0.18274
yegR	-0.341551	0.784178	-0.432041
fimB	-0.27831	0.570435	-0.315373
yghZ	-0.597185	1.235164	-0.761132
yaaY	-0.947889	2.018623	-0.934967
yohH	-0.393272	0.833387	-0.413128
htpG	-0.302109	0.623949	-0.309354
cspD	-0.516765	0.860125	-0.431426
yfjG	-0.36455	0.436516	-0.264292
fucO	-0.576386	0.813592	-0.476327
fadR	-1.051471	1.473713	-1.138622
dgsA	-1.9123	2.58655	-1.972478
ypjK	-0.768702	0.946808	-0.702021
rsmC	-0.330972	0.243768	-0.228541
btuE	-0.789143	0.693555	-0.595406
cobC	-0.590466	0.438909	-0.589659
yniB	-0.550142	0.494799	-0.547141
dicB	-1.978375	1.810674	-1.962854
yhgN	-0.403731	0.236049	-0.305804
phoB	-0.071343	0.038371	-0.050222
hyaF	-0.254844	0.143623	-0.144256
yjcH	-0.173081	0.370653	-0.495047
dinB	-0.337819	0.674616	-0.75015
yhdY	-1.014053	0.970538	-1.327781
ybgS	-0.716968	0.646913	-0.852598
cusB	-0.583599	0.525339	-0.803216
nadA	-0.458891	0.488068	-0.68794
potE	-0.222263	0.219821	-0.349954
flgH	-0.294253	0.378965	-0.529157
hcaE	-0.747405	0.891946	-1.296868
ydjG	-0.816829	1.032441	-1.342991
ybcQ	-0.430857	0.650192	-0.785672
yafL	-0.29425	0.370525	-0.61514
astE	-0.400817	0.509267	-0.783617
ygbF	-0.998913	0.519286	-1.679788
yacL	-0.668284	0.374341	-1.212512
yccS	-0.82384	0.536723	-1.574305

trkA	-0.940075	0.825708	-1.776132
tesB	-0.534715	0.323665	-0.776599
rluB	-0.950907	0.70471	-1.420092
entB	-0.877585	0.41128	-1.033791
yedO	-0.943658	0.468701	-1.063825
zwf	-1.784272	0.178536	-0.559204
stfR	-1.390102	0.141525	-0.437395
ydjJ	-1.415803	0.248889	-0.533756
yfbG	-0.963096	0.15058	-0.335973
yfiM	-0.46707	0.151727	-0.211921
lhr	-0.310011	0.092255	-0.133581
slyB	-0.662925	0.273626	-0.259823
ndk	-2.674304	0.328997	-1.853079
mdoG	-2.899691	0.750492	-1.5781
ihfB	-2.449598	0.6295	-1.663031
gatY	-0.830819	0.015507	-0.382346
cysZ	-0.800978	-0.04881	-0.420415
clpA	-1.448869	-0.070833	-0.93443
pdxJ	-1.717687	-0.101304	-0.536637
gcvR	-1.864632	-0.231777	-0.751898
yecM	-1.869809	-0.186817	-0.699966
yeiE	-0.7773	-0.03838	-0.316697
ymfI	-0.669976	0.04442	-0.663424
ybjM	-0.277923	0.049734	-0.332499
ydaW	-0.65739	0.085829	-0.795118
serC	-2.17064	-0.185871	-1.973504
serA	-1.352647	-0.132792	-1.204162
adhP	-1.598972	-0.09122	-1.706335
gatC	-2.133049	-0.790637	-0.66786
ybiP	-0.873122	-0.278593	-0.279776
miaB	-1.451351	-0.366362	-0.702867
cedA	-0.812509	-0.214475	-0.357713
mhpT	-1.14391	-0.3342	-0.507506
manY	-2.179517	-0.645621	-1.27463
tfaD	-0.720527	-0.359407	-0.393224
yebE	-0.515848	-0.227983	-0.280909
ydhS	-0.29081	-0.13426	-0.169722
yoaA	-0.964865	-0.442372	-0.476106
yahJ	-0.379653	-0.179118	-0.174652
yjiK	-0.83667	-0.385549	-0.588784
treA	-0.385015	-0.156268	-0.253976
potI	-0.836211	-0.308222	-0.555184
tdcG	-0.22607	-0.064065	-0.182951
pepP	-0.531509	-0.157612	-0.463272
ihfA	-2.526009	-0.912099	-2.25931
dicC	-1.039302	-0.321539	-0.778041
ynfN	-1.122605	-0.334605	-0.842276
yohL	-1.173923	-0.544036	-1.034926
ebgC	-0.656105	-0.329175	-0.577014
ycjN	-0.474994	0.084954	0.07216
ydiS	-1.419346	0.043913	0.310707
yeaY	-1.119593	0.035285	0.17099
ycgM	-1.52938	-0.053755	0.171563
fsr	-1.300891	0.009791	0.03146
fucA	-0.828723	-0.072646	0.029694
oppB	-0.749926	-0.063714	-0.023976
ydbC	-1.184267	-0.126722	-0.001582
gatZ	-1.595624	0.130905	-0.234799
pntA	-0.360146	0.045094	-0.041859
yoeB	-1.193702	0.106816	-0.074715
yeaX	-1.232838	0.04236	-0.143097

ddpC	-0.245784	-0.019204	-0.043305
yccU	-0.541241	-0.02372	-0.091057
nac	-1.043104	-0.501721	0.28615
tar	-1.211047	-0.436274	0.18921
tam	-0.867587	-0.298243	0.184619
puuC	-0.987238	-0.372847	0.209028
sra	-1.259655	-0.355074	0.306105
ycbW	-0.501655	-0.158816	0.170323
mog	-2.242777	-0.756033	-0.09492
dps	-0.937562	-0.328632	-0.0371
srlB	-0.706637	-0.206674	-0.046205
flxA	-1.657322	-0.660698	-0.292455
tbpA	-0.157073	-0.063938	0.009106
ubiG	-0.171909	-0.093405	0.023432
cbpA	-0.450745	-0.2465	0.011071
bcr	-0.977181	-0.709588	-0.003563
argA	-0.970513	-0.61776	0.024812
iscR	-2.166785	-1.633672	-0.580498
yfeY	-0.283504	-0.232284	-0.077839
mraZ	-2.271098	-2.1096	-0.551835
dbpA	-0.895182	-0.753763	-0.154513
fumC	-0.795162	-0.795341	-0.131582
yahB	-2.133585	-1.362134	-0.439522
yfeW	-1.220749	-0.757291	-0.206696
tsr	-2.802049	-2.304299	-2.07087
ydeE	-0.35883	-0.272655	-0.278851
yecS	-0.931984	-0.759864	-0.593585
dld	-0.788623	-0.663483	-0.541591
gdhA	-1.086967	-1.10033	-0.856376
hycG	-0.660004	-0.396277	-0.310914
ssuD	-1.321225	-0.735177	-0.636718
paaI	-0.583775	-0.397782	-0.264904
entE	-1.279115	-0.835222	-0.622141
ssuB	-1.03626	-0.764969	-0.615132
paaC	-1.088528	-0.743975	-0.582924
yjdI	-0.387129	-0.471298	-0.156794
yebK	-0.668715	-0.817576	-0.251736
astC	-0.445367	-0.497952	-0.157461
cirA	-0.550803	-0.578682	-0.230157
yjiE	-0.665569	-0.978315	-0.318427
ycaJ	-1.062818	-1.429631	-0.539283
yciG	-1.352987	-1.814232	-0.732892
folM	-0.419328	-0.492281	-0.082725
ompN	-0.780408	-0.941787	-0.176889
cysB	-0.86222	-0.837483	-0.428839
rtn	-0.800471	-0.782884	-0.377097
trpC	-1.865928	-1.661749	-0.981524
yddK	-0.774026	-0.761198	-0.476048
ydiT	-0.396544	-0.41489	-0.256126
amn	-1.186849	-1.334811	-0.699359
ydhV	-1.296913	-1.394318	-0.717498
tynA	-1.380769	-1.627254	-0.728402
sgcC	-0.798305	-1.002414	-0.534728
yjbO	-0.284434	-0.388374	-0.196637
aegA	-0.997525	-1.326821	-0.703222
dinI	-0.559651	-0.795475	-0.378475
yegL	-0.793344	-1.110322	-0.708991
yedY	-1.397903	-1.830758	-1.275522
fecD	-1.281319	-1.586878	-0.989935
pbpC	-0.342243	-0.490959	0.24782
abgA	-0.430728	-0.603804	0.323414

ycgJ	-0.525173	-0.687602	0.250229
yeeV	-0.261543	-0.257631	0.004132
yfcP	-1.071384	-1.135345	0.018949
hdhA	-0.633265	-0.783709	0.150926
cysK	-0.903701	-1.014701	0.221441
glyA	-0.79215	-0.843905	0.146082
kdpE	-1.037931	-1.181703	0.189543
ydhL	-1.03469	-1.401715	0.116577
tdcC	-0.923648	-0.50517	0.498705
ynbE	-0.720266	-0.500233	0.393282
rssB	-0.805581	-0.797276	0.342154
kdgT	-1.114395	-1.136641	0.449491
ydhB	-0.697591	-0.647428	0.254975
yjbQ	-0.607482	-0.397264	0.209742
yciE	-1.162859	-0.72078	0.465789
tehB	-0.890468	-0.683516	0.356923
ynjB	-0.831445	-0.631334	0.323304
cysU	-1.378969	-0.970885	0.352314
maa	-0.885629	-0.825994	1.0884
yfcV	-0.373671	-0.372639	0.504235
ycgE	-0.581987	-0.439782	0.664248
hokB	-0.112484	-0.140788	0.174808
yajR	-0.439528	-0.564762	0.615007
ybaB	-1.149352	-1.44088	1.584741
dmsD	-0.571019	-0.632418	0.735764
yeeI	-0.999482	-1.13692	1.19465
fdnH	-0.41843	-0.339591	0.337336
yecF	-0.996697	-0.811916	0.852732
ydcJ	-1.029632	-0.850346	0.737918
solA	-2.710521	-1.797998	2.341089
yjfM	-0.403201	-0.345049	0.416135
ybiO	-0.584381	-0.48498	0.577483
ydhY	-1.160792	-0.993897	1.091188
amyA	-1.259611	-1.527668	1.109527
yiiS	-1.725663	-1.947606	1.813376
yebT	-0.498572	-0.538548	0.503846
azoR	-0.102049	-0.354851	0.25419
miaA	-0.280513	-1.129881	0.757801
ydhZ	-0.08305	-0.318577	0.215131
yhbH	-0.071082	-0.230446	0.179529
ydeI	-0.507431	-1.560661	1.278765
ycdO	-0.750094	-2.200176	1.755453
ygjV	-0.511315	-1.364178	1.176522
ymcD	-0.366772	-1.016643	0.752483
lon	-0.740502	-3.591922	3.220497
setA	-0.159272	-0.879642	0.757571
yijP	-0.60753	-2.926097	2.450496
apaH	-0.334371	-1.605538	1.599226
ychP	-0.254701	-0.797204	0.85733
ycdH	-0.458004	-1.094275	1.223959
ycgX	-0.253775	-0.798288	0.750093
yihF	-0.319011	-0.697597	0.375796
sanA	-1.392239	-3.488194	1.818195
mutH	-0.651656	-1.392015	0.638931
ybgD	-0.992865	-1.585944	1.054766
ydhT	-0.981996	-2.305973	1.621299
ycdK	-0.988176	-1.849277	1.16676
prpC	-0.909097	-1.985161	1.235874
bglA	-0.918588	-1.461383	1.202627
rarA	-0.909649	-1.743072	1.453348
edd	-0.897705	-1.733718	1.373957

trxC	-0.598943	-1.028292	1.044796
rhaD	-0.23553	-1.091082	0.330282
yifE	-0.898124	-4.140138	1.437382
yfhQ	-0.722124	-3.754371	1.390866
nadB	-0.248951	-1.481869	0.608893
phnG	-0.305231	-0.948935	0.361546
fepE	-0.070282	-0.345316	0.175221
agaB	-0.429182	-2.037177	1.06034
ybaT	-0.644211	-2.476666	1.244015
dhaL	-0.257461	-1.585702	0.87504
araF	0.002095	-0.211082	0.09294
acpT	0.052403	-2.697148	1.216345
yfaO	-0.02428	-0.97814	0.533405
yqgB	-0.039613	-1.007083	0.546757
rph	-0.122265	-3.666289	2.065974
yqeI	0.040773	-1.656584	0.841775
ymgH	0.002186	-1.368677	0.706791
agaR	0.099313	-2.147623	1.221041
yfbV	-0.049559	-0.467981	0.337956
ycgI	-0.136558	-1.478633	1.018394
yjfK	-0.125411	-0.87725	0.583865
pqiB	-0.079192	-1.794194	1.446012
yadB	-0.068508	-3.062943	2.219895
hybC	0.013495	-1.068515	1.016526
frwB	-0.288113	-1.013784	-0.092089
yjiZ	-0.163473	-0.446771	-0.02566
dadX	-0.262359	-0.776778	-0.131719
yciV	-0.302117	-0.983089	-0.172143
yciN	-0.380802	-2.048052	0.078696
yaaX	-0.255325	-1.015574	0.081533
ydfI	-0.411977	-0.803965	-0.180022
trg	-0.700334	-1.481345	-0.219474
yihD	-0.486912	-0.836318	-0.032209
ybeT	-0.694255	-1.1659	-0.055073
cueR	-0.259238	-0.445799	-0.026522
fimZ	-0.562837	-0.868875	-0.116887
ydcF	-0.456264	-0.996071	0.251324
hsdM	-0.575354	-1.417488	0.44979
ompT	-0.825782	-1.862056	0.658763
tauD	-0.467585	-1.613591	0.438908
ymfG	-0.27398	-0.791758	0.187417
ycgB	-0.404289	-1.087621	0.255343
yajI	-0.481694	-1.324252	0.29435
cchA	-0.249268	-0.63497	0.126481
yahM	-1.782487	-5.10538	0.810357
hchA	-0.495831	-1.556994	0.285812
galT	-0.614223	-1.396455	0.043798
thiI	-0.650496	-1.730119	0.188218
trpL	-0.943045	-2.428766	0.174796
allR	-0.445634	-0.922337	0.169941
ygaP	-0.331647	-0.670808	0.096135
yoaB	-0.387739	-0.915896	0.13483
sdiA	-0.330195	-0.811401	0.129023
blr	0.835852	-0.123065	0.179838
yigI	1.611654	-0.304357	0.213016
ygcP	0.944493	-0.245353	0.175383
dcrB	1.287375	-0.272021	0.260342
yjbF	0.821976	-0.409903	0.256775
yqeC	1.302593	-0.564326	0.287065
artI	1.08757	-0.481309	0.210016
ampE	1.929546	-1.181851	0.392493

yjcQ	0.661515	-0.277628	-0.082989
cadB	1.417479	-0.611098	-0.060384
ybaA	0.993947	-0.465433	-0.086113
yfjY	0.950019	-0.250345	-0.090715
rsd	1.364492	-0.347694	-0.124212
trpA	0.129387	-0.108817	0.010113
rplI	1.061246	-0.855965	-0.018706
yfdL	0.893211	-0.685459	-0.000255
yiaH	1.511367	-1.117783	-0.153625
lldP	0.807684	-0.517541	-0.16905
yibG	1.547236	-0.000071	-0.848272
frdA	2.917412	-0.150499	-1.643201
yieF	0.605726	-0.074993	-0.274131
yjbG	0.433175	-0.055048	-0.192969
yqeB	0.290594	-0.038592	-0.116107
yidB	0.860899	-0.234561	-0.245403
inaA	1.08287	-0.248446	-0.276
paaX	0.694356	-0.140436	-0.218083
galK	0.537477	-0.082387	-0.183338
ulaB	0.855343	-0.130393	-0.23651
ypjB	0.90956	-0.225921	-0.362887
yddW	0.624579	0.079022	-0.312854
yagS	2.816909	0.249577	-1.396755
ttdA	0.847839	0.101236	-0.304914
dsdX	0.595839	0.064039	-0.247402
hsdS	1.68692	0.262254	-0.681701
argF	4.532295	0.883172	-2.716538
yjjY	1.946348	-0.280514	-0.057902
phnM	0.513669	-0.054155	-0.033179
phnE	1.54684	-0.05055	-0.087095
yobH	0.768864	-0.13765	0.032692
yqeH	0.561939	0.046187	-0.032412
ydcT	1.357005	0.02654	0.091765
ybaS	1.187269	0.094457	0.056783
yjfF	0.870276	0.121319	-0.231334
yhbU	0.673802	0.09713	-0.109511
phnP	0.614342	-0.016424	-0.118241
yagE	3.971057	-0.070508	-0.677154
ykfA	2.664767	0.042103	-0.401809
iclR	0.865027	-0.005466	-0.779706
yliH	0.692172	-0.086455	-0.700798
metF	1.338205	-0.208573	-1.394102
udp	0.709593	-0.098151	-0.671553
hypC	0.796978	-0.083874	-0.735695
argB	1.499235	-0.178799	-1.303913
yrfA	2.08656	-0.490067	-2.408326
yiaW	0.614873	-0.126899	-0.692539
yjgB	0.622667	-0.008489	-0.450863
ybiR	1.949938	0.012418	-1.397596
tesA	0.854159	0.039855	-0.674829
rbbA	1.068353	0.178386	-0.838894
cmtB	0.912318	0.157329	-1.403266
sgbE	1.127171	0.157704	-1.861801
yjjX	1.209989	0.055739	-1.838197
rhtC	1.088336	0.243036	-2.025085
aldB	1.149272	0.258026	-2.053313
fixB	0.375461	0.065316	-0.697913
yrfB	0.818125	0.08884	-1.482222
ppdB	0.493774	0.050648	-1.019289
asnA	0.646881	-0.063037	-1.190546
yjiN	0.201802	-0.018205	-0.386138

ybfC	0.438583	0.01211	-0.751213
yjjM	0.523189	-0.006138	-0.961507
thiG	0.692366	-0.034598	-1.034895
cpsB	0.533095	-0.055791	-0.842233
ybbD	1.084892	-0.037966	-1.778161
relA	1.518597	-0.094876	-2.509285
hybE	0.70369	-0.065883	-0.974472
ibpA	0.802407	-0.018903	-0.994406
ybiI	1.559734	-0.019784	-2.03231
ampH	1.2098	0.098679	-1.594057
ykiA	0.456607	0.06447	-0.56331
yagB	1.405063	0.126406	-1.583041
nrfE	1.056155	0.606124	-1.901269
fhuC	0.532008	0.208261	-0.921029
ycjV	0.668858	0.3368	-1.276531
mrcB	1.743324	0.741051	-3.47611
pldA	0.580648	0.181211	-0.894789
glgS	0.323257	0.066709	-0.461965
bioB	0.456407	0.085914	-0.637756
mmuM	1.70438	0.436269	-2.2094
gapA	0.929656	0.377399	-1.142508
yhdE	1.327523	-0.371699	-1.885887
rimI	0.349502	-0.102107	-0.477835
yjgI	1.053966	-0.227581	-1.511357
ybhS	1.673709	-0.698921	-2.580221
grxA	1.114011	-0.461413	-1.710757
tktB	0.717953	-0.319134	-1.25194
ilvE	1.146733	-0.475234	-1.952576
chbG	0.657238	-0.267776	-1.067305
gldA	1.146726	-0.292645	-1.931208
psiF	0.544686	-0.179319	-0.883621
yhjC	0.703983	-0.169584	-1.344723
dgoA	1.532372	-0.449709	-2.855976
yagY	1.148982	-0.370622	-2.208108
ypjC	1.356599	-0.354513	-2.440295
kdsC	2.144624	-0.967748	-2.718046
ygeQ	1.657555	-0.650464	-2.204001
ilvY	0.936925	-0.413833	-1.325715
lysS	0.522926	-0.303665	-0.715201
yjhT	1.225402	-0.80733	-2.043379
yidX	1.417866	-0.917251	-2.354254
yagW	1.097322	-0.54447	-1.68864
ascF	0.451249	-0.244427	-0.679673
ytfR	0.44769	0.355099	-0.515859
yfiL	1.052704	0.731442	-1.112861
yggJ	0.801069	0.458605	-0.833433
ydfT	0.395866	0.20231	-0.36409
betT	1.560445	0.719153	-1.562063
fliY	0.42185	0.212704	-0.481533
rffD	1.411849	0.912519	-1.774132
csgB	0.645804	0.500813	-0.972102
ykgJ	1.04995	0.65639	-1.517656
pepE	0.755974	0.409325	-0.205054
msyB	0.676736	0.42403	-0.145997
garR	1.976378	0.593733	-0.696052
yheS	0.840177	0.214737	-0.300136
ykiB	1.186995	0.364206	-0.475263
ykgN	2.320009	0.743268	-0.991311
glnP	0.185262	0.094046	-0.076762
ygjF	1.221438	0.575899	-0.463853
afuB	2.492073	1.185172	-0.870178

ykfH	2.518912	0.981401	-0.941542
yedI	0.753969	0.31046	-0.562241
iscU	0.998832	0.368211	-0.809257
yjcP	1.345454	0.372974	-0.951357
yagR	1.096187	0.355925	-0.740155
asnC	0.881481	0.40206	-0.536327
puuD	0.498026	0.185177	-0.298058
atoC	1.178633	0.730576	-0.717588
lldR	1.119095	0.803272	-0.707285
ligB	1.116496	0.597561	-0.77157
gntP	1.05372	0.509312	-0.74886
pepQ	0.786906	0.502828	-0.578771
intF	2.581654	1.712998	-1.904943
ybdL	0.493208	0.288158	-0.35971
mhpF	1.198332	0.723563	-0.821363
yeiJ	0.732345	0.626176	-0.56979
katE	0.308383	0.211604	-0.148457
yafO	1.257704	0.92604	-0.583128
yagL	3.469591	2.619763	-1.811727
uspA	1.599352	-0.676147	-0.73435
deoA	1.083259	-0.497664	-0.505907
ygjM	1.021471	-0.595873	-0.555862
mltD	1.389199	-0.716903	-0.691983
yggX	1.803763	-1.001876	-0.596452
thiC	0.444576	-0.236733	-0.180568
arsB	1.206583	-0.672317	-0.490839
ybbW	0.401897	-0.150142	-0.384532
frsA	1.222244	-0.403247	-1.091719
yfiQ	1.932254	-0.979829	-1.979334
ydjA	0.479024	-0.274091	-0.422272
malY	0.372101	-0.184528	-0.33175
ampG	0.587906	-0.273374	-0.516071
dedD	0.711736	-0.419476	-0.503699
kil	0.261809	-0.140612	-0.158542
lsrF	0.365166	-0.169334	-0.250318
sstT	1.265065	-0.688886	-0.962362
minD	3.103238	-1.554324	-2.333568
barA	1.305405	-0.908646	-1.068664
actP	1.41251	-0.964955	-1.138846
rfaL	0.363593	-0.138776	-0.253709
fhlA	0.652413	-0.189241	-0.356906
nanA	0.783235	-0.222604	-0.498613
yojI	0.750668	-0.712932	-0.320713
rng	2.257408	-2.147248	-1.191809
yidG	0.508373	-0.368962	-0.186951
yghR	0.429802	-0.329607	-0.172477
ytfK	0.893593	-1.09792	-0.626462
cheA	1.061945	-1.259454	-0.671821
ytfL	0.290997	-0.314522	-0.209957
xerC	1.929861	-2.091913	-1.422885
ybgQ	0.466247	-0.532432	-0.335685
ydiZ	0.932154	-1.153903	-0.716867
xdhA	0.878241	-1.09026	-0.735008
ybdB	0.462512	-0.471171	-0.356523
yagH	0.704981	-0.647513	-0.514332
ynjI	0.490958	-0.456579	-0.4283
racC	0.852581	-1.054413	-0.273166
yijO	0.99435	-1.271441	-0.245442
yiaA	0.814383	-0.850859	-0.213788
qseB	0.634675	-0.986016	-0.261394
dinF	0.36606	-0.485153	-0.160811

gidB	2.166116	-3.314547	-1.922501
yijF	0.68749	-1.028479	-0.527744
ygfM	1.823583	-2.924319	-1.398575
ytjC	0.992857	-2.126497	-1.048847
ylaB	0.812031	-1.969744	-0.92599
glcC	1.191851	-2.319165	-1.294952
radA	1.096098	-1.073524	-1.333107
eutB	0.712711	-0.562883	-0.801877
yhbX	0.250347	-0.26498	-0.409156
dipZ	0.955839	-1.056853	-1.584682
ygbA	0.684031	-0.692903	-1.008282
yieM	1.730446	-1.340798	-2.394985
hofQ	1.60532	-1.310786	-2.339777
glnE	1.206013	-0.911859	-1.890398
greB	0.103676	-0.283015	-0.178955
yfjH	0.925151	-2.059999	-1.376602
rfaH	1.73606	-3.532451	-2.631359
yedJ	0.306082	-0.589674	-0.444908
yhbW	0.623475	-1.292154	-1.036534
glgC	0.594246	-1.501985	-1.20001
trmH	0.74374	-1.832608	-1.518914
mdoB	0.106721	-0.12321	-0.116734
fdhF	0.480968	-0.551253	-0.524663
yhhJ	1.520227	-1.540157	-1.616063
sodB	0.591658	-0.684601	-0.738632
narY	0.522658	-0.824516	-0.586299
ybjL	0.840952	-1.249115	-1.093164
ybjR	1.102168	-1.614459	-1.481289
yfjZ	0.8746	-1.149547	-1.024544
ygiQ	0.440181	-0.597361	-0.721932
yqaD	1.014144	-1.473812	-1.7295
bioC	0.836574	-1.082832	-1.20985
yiaG	0.837233	-1.440009	-1.491872
fecC	0.790919	-1.34123	-1.467421
hha	0.994215	-1.719563	-1.696436
yqcB	1.05026	-1.937064	-1.882767
rbsR	1.027614	-1.685425	-1.648295
tauA	1.063368	-2.102553	-1.920168
yicG	0.372888	-0.727583	-1.01131
yqeK	0.879882	-1.871072	-2.589974
puuA	0.655109	-1.452565	-1.967095
ugd	0.256047	-0.379686	-0.556109
nikR	0.498682	-0.729029	-1.076623
yrhB	0.532844	-0.794524	-1.3058
hyaC	0.444366	-0.729025	-1.127433
mutS	0.769726	-1.25637	-1.59012
deoD	0.72076	-1.046539	-1.403657
yhhW	0.866224	-1.557253	-2.049068
yhiN	1.415988	-2.531559	-2.936393
nikC	1.790399	-3.106715	-3.70981
yjiO	0.811626	-1.538972	-1.695586
mgtA	0.27088	-0.671724	-0.779458
ygcR	0.747094	-1.985678	-2.391432
yfiP	0.907263	-2.626085	-2.934924
yfdF	0.078612	-0.219167	-0.248235
cspA	1.07182	-3.143398	-3.410528
yaiP	0.435561	-1.175715	-1.176273
hrpA	0.113848	-2.511684	0.130253
hyfI	0.029164	-0.376872	0.012482
nikA	-0.000986	-0.67094	0.056467
idnR	-0.071919	-1.835423	0.056453

caiC	0.014906	-2.171616	0.028312
yrbG	0.965352	-6.474004	-0.158433
mglC	0.105614	-0.98243	0.000907
nanR	0.150273	-1.640055	0.429825
recO	0.250778	-5.107595	0.998659
alkA	0.583126	-7.549303	1.085856
recT	0.749163	-5.347082	0.580511
sgbU	0.700583	-5.82493	0.570671
tas	0.124492	-0.820736	0.107615
yccZ	-0.059899	-0.605337	0.183784
hdfR	-0.11292	-2.667873	0.562027
macA	-0.007281	-2.680475	0.656971
hinT	-0.009205	-1.398897	0.373623
cspE	-0.020467	-2.225642	0.575959
ynjA	-0.5279	-3.061263	0.53886
xdhB	-0.267826	-2.656131	0.526301
holC	-0.042189	-6.273183	-1.158985
potB	-0.281216	-3.92256	-0.96478
recE	-0.034553	-3.053009	-0.711345
uxuA	-0.050425	-1.570227	-0.379748
ygeX	-0.059062	-2.208217	-0.522509
baeS	-0.053725	-5.602069	-1.644624
vacJ	-0.020184	-15.386559	-4.428018
hcaF	-0.010535	-2.379251	-0.657625
frlR	-0.131383	-1.192796	-0.355925
nlpB	-0.260118	-2.575863	-0.795768
yeiU	-0.304448	-4.070959	-1.359447
yiaY	-0.192675	-2.095952	-0.319385
potA	-0.2256	-2.371393	-0.376261
yfeZ	-0.219361	-2.141347	-0.340249
ydiD	-0.169775	-1.139697	-0.162192
yfhH	-0.293949	-1.587961	-0.25842
ydfW	-0.298402	-1.825403	-0.321773
dinJ	-1.211147	-10.163123	-0.783339
xylE	-0.078809	-0.552668	-0.049097
yrbB	-0.18143	-14.12006	-0.424237
ydaV	0.005002	-0.357714	-0.023218
yrbC	-0.673019	-13.913812	-1.644272
acrE	-0.171401	-7.580551	-0.724985
rfaG	2.106557	-3.891163	-0.370508
rfbC	0.318948	-0.608271	-0.115185
yliJ	0.445307	-0.916219	-0.247303
yhjR	0.632	-1.2036	-0.332156
yciW	0.417715	-1.304089	-0.239965
eutI	0.179159	-0.462182	-0.0722
hslU	0.963132	-3.030667	-0.204334
yghQ	0.552045	-1.543761	-0.004646
speF	0.326934	-0.987082	-0.352471
pitB	0.16388	-0.54911	-0.187111
yjiT	0.297189	-0.806833	-0.267855
yphA	0.78979	-2.066122	-0.695949
ptsP	1.870829	-8.438247	-2.884498
eutL	0.20949	-1.18551	-0.321329
ugpB	0.311698	-1.814737	-0.503707
tauC	0.400603	-1.924737	-0.563078
recG	1.392877	-6.783041	-1.539643
yhjE	0.353755	-1.466567	-0.370579
rfaY	0.867548	-3.529095	-0.923673
ydfC	0.745553	-3.348343	-0.28509
npr	1.35932	-5.642649	-0.577986
ssnA	0.230603	-0.93542	-0.110889

ygcL	0.409575	-1.820799	-0.33589
yrbF	1.227419	-10.927945	-1.03972
yggL	0.030391	-0.180652	-0.014153
ygcF	0.177318	-1.186524	-0.172252
rfaQ	1.757432	-20.096552	-3.176974
yhhZ	0.147601	-1.876263	-0.317439
yrbD	1.377828	-16.152401	-2.055118
ybjX	0.434233	-7.175174	-1.020814
recF	0.080406	-1.812338	-0.391935
cusR	0.145492	-1.776438	-0.410061
yhhF	0.517674	-4.688965	-1.07927
rhaA	0.028152	-0.49373	-0.422237
smpB	0.078071	-0.832875	-0.730397
srlA	0.121651	-1.08846	-0.938388
yphC	0.080836	-0.775274	-0.674433
yjhQ	0.219489	-2.151917	-1.86721
rhaR	0.165667	-1.366352	-1.196283
ygcJ	0.226281	-1.957913	-1.784015
yiaC	0.077339	-0.408396	-0.398205
uxaA	0.325484	-1.778981	-1.68416
cvrA	0.25408	-1.571983	-1.43211
xylB	0.324306	-2.318708	-1.792123
soxS	0.357529	-2.30265	-1.719386
yjhP	0.320151	-1.524964	-1.082335
dedA	0.548642	-2.440121	-1.738421
yfcX	1.092979	-3.576601	-2.704566
setC	0.385358	-1.338877	-0.970879
paaF	0.171855	-0.533003	-0.45124
ydfD	0.315453	-1.145235	-0.99578
hybD	0.542556	-2.077356	-1.683203
yghS	0.46933	-1.85344	-1.480551
mdtE	-0.006986	-3.593733	-3.397502
qseC	-0.079884	-1.927127	-1.957623
glcE	0.029666	-0.94139	-1.00619
yiiG	-0.000642	-1.322555	-1.430672
sbp	-0.32556	-2.109397	-2.153799
ygaT	-0.27749	-2.022406	-2.05116
yphB	-0.114096	-0.772916	-0.848993
yeiP	-0.240924	-1.89907	-2.040935
dppA	-0.178586	-1.955066	-2.058194
rtcB	-0.048673	-0.515934	-0.478872
bglH	-0.061123	-0.728679	-0.700489
hokD	-0.147756	-1.17041	-1.091171
yhdJ	0.009072	-1.327799	-1.118137
proQ	-0.031404	-4.016513	-3.542795
ydhM	-0.009259	-1.30345	-1.122911
yjjB	-0.042669	-1.428852	-1.259424
pqqL	-0.09552	-1.391463	-1.150498
ybbB	-0.363398	-4.473125	-3.586987
yfgG	-0.03308	-0.482323	-0.414706
oppD	-0.063343	-1.214435	-1.044737
acrA	-0.823914	-12.421183	-10.956497
yrbL	0.410259	-2.70774	-1.301693
hcp	0.216585	-1.163407	-0.570627
gss	0.219548	-1.319651	-0.571439
tag	0.69746	-2.088741	-0.93612
gutM	0.11079	-0.446626	-0.220513
ymcA	0.774604	-3.078096	-1.408573
recB	2.459587	-8.244472	-4.269249
yihV	0.379623	-1.244672	-0.629985
rbn	0.367771	-1.317354	-0.710008

kdsD	0.575507	-2.142894	-1.246558
nagA	0.851806	-3.188562	-1.795536
hsrA	0.641805	-2.97257	-1.679817
mhpB	0.080252	-0.330737	-0.209518
yphD	0.468801	-1.89172	-1.204766
yeiA	0.245807	-1.013762	-0.627199
phoQ	0.360962	-8.131056	-3.218932
exuT	0.112477	-1.962078	-0.571228
rfaI	0.242	-4.893647	-1.577103
ygcS	0.164928	-2.509183	-0.848487
ygeY	0.175722	-1.600452	-0.548343
phoP	1.106376	-7.633856	-2.856
tig	0.885002	-6.769031	-2.471239
eutH	0.217353	-2.004054	-0.780463
ydcQ	-0.808062	-7.908676	-3.896591
ydfQ	-0.114477	-1.568868	-0.83943
rffG	0.072099	-1.104741	-0.491767
recJ	0.269661	-4.366286	-2.139114
asmA	0.127621	-3.130308	-1.480215
thiS	0.039677	-3.507919	-1.705392
yahA	0.017428	-2.109618	-0.983594
ybiB	0.017221	-1.078436	-0.546214
ydfV	-0.011982	-5.293201	-2.333761
ybhT	-0.019767	-9.320434	-4.247045
ymgE	-0.016269	-0.600517	-0.24573
kdpD	-0.076923	-11.417971	-4.715511
narQ	-0.827246	-12.597213	-5.464064
yfhA	-0.13744	-2.281768	-1.021672
dmsC	-0.212811	-3.307081	-1.533037
purR	-0.231023	-5.38534	-2.538288
acrB	-0.681839	-27.450932	-13.44226
yifN	0.065191	-1.077161	-0.697303
bolA	0.081749	-2.097691	-1.447747
rseB	0.025674	-8.858279	-6.15423
nirC	0.177672	-2.925463	-2.166295
vsr	0.109285	-0.975211	-0.567479
hybF	0.169947	-1.254797	-0.823943
yeeR	0.161381	-1.154687	-0.747116
nudC	0.653771	-5.285899	-3.305315
yhiL	0.386608	-3.689576	-2.29838
rpoZ	0.063873	-9.192273	-5.393381
yqfE	0.109236	-1.619155	-0.928327
livM	0.145571	-2.054767	-1.194649
eutE	0.099917	-1.849104	-1.074605
ycdB	0.102308	-3.009436	-1.645079
ycfL	-0.067612	-1.946919	-1.19803
ybiH	-0.051333	-2.335367	-1.483674
yhcN	-0.080954	-1.198269	-0.730037
glnB	-0.202255	-3.31483	-2.093521
lrp	-0.360582	-3.292813	-2.325522
yejG	-0.092229	-0.960956	-0.65357
yfiC	-0.361241	-2.747479	-1.843935
yddB	-0.033695	-0.191883	-0.051572
ycfR	-0.608251	-2.818597	-0.770853
yjjJ	-0.645257	-1.940817	-0.760958
cpdA	-1.279371	-4.067515	-1.265423
ddpA	-0.477696	-1.711176	-0.796213
yhhY	-0.689984	-1.99593	-1.047759
hlpA	-2.444568	-7.745214	-4.068846
yecP	-1.217266	-4.054689	-2.079054
marA	-0.912195	-4.046488	-1.614117

ycaM	-0.11936	-0.486401	-0.203283
ygaW	-0.235592	-1.344749	-0.610722
yfeC	-0.471619	-2.767041	-1.248383
fadL	-0.193496	-1.095229	-0.507774
gcvP	-0.237253	-1.205328	-0.550388
hyfA	-0.153353	-0.886522	-0.454031
yfjW	-0.244015	-1.44258	-0.714641
rluA	-0.25484	-1.290519	-0.688663
ydfZ	-0.708543	-2.297905	-1.699626
sspA	-3.994271	-12.062497	-8.967121
yeaB	-0.255852	-1.009627	-0.670116
rraA	-0.605596	-2.667895	-1.795464
holE	-0.402097	-1.627827	-1.167603
ybdJ	-0.261489	-0.909878	-0.598608
yaeP	-0.267837	-0.71104	-0.473733
ygfI	-0.590681	-1.675695	-1.066919
wzxC	-0.212841	-0.629497	-0.65362
dsdA	-1.296127	-4.695814	-4.674784
yncA	-0.833062	-2.206174	-2.0864
yehB	-0.485363	-1.413632	-1.337417
ydcN	-0.854598	-2.003857	-1.949801
nfsA	-0.854175	-2.594592	-2.148522
fhuF	-0.373624	-1.240734	-1.089406
ydjX	-0.282307	-0.9607	-0.828118
xylA	-0.262046	-0.679645	-0.552547
xapR	-0.441493	-1.084035	-0.908556
yqgA	-0.422141	-2.02779	-1.743613
yciQ	-0.282392	-1.322022	-1.065438
osmY	-1.436502	-2.47864	-1.276877
mrcA	-1.569751	-2.87309	-1.202684
ycaQ	-0.465889	-0.820875	-0.347044
ycfN	-0.439569	-0.89374	-0.292156
ycfZ	-0.571809	-1.239986	-0.615073
yncG	-0.630049	-1.281546	-0.697968
potH	-0.432901	-1.129939	-0.597356
yhdL	-0.560808	-1.423784	-0.729684
dmsA	-0.537857	-1.317076	-0.6764
yaaI	-0.617644	-1.472986	-0.664724
mpl	-1.432627	-3.282587	-2.022247
fimE	-4.121028	-8.823529	-5.652249
yfdV	-0.208278	-0.491499	-0.273956
intE	-0.726655	-1.610856	-0.921809
emtA	-0.941235	-1.986256	-1.188757
osmB	-0.595125	-1.214076	-0.714163
ybhN	-0.377959	-0.658639	-0.426791
ptsG	-1.882918	-3.226834	-2.325563
csiE	-0.996902	-1.531801	-0.935662
ygiW	-1.258594	-1.898197	-1.341482
trpD	-0.879656	-1.366676	-0.917362
ybjT	-1.761054	-2.771139	-2.263787
yqcA	-1.284123	-2.392725	-1.854396
yceG	-1.108892	-2.050081	-1.60644
pepN	-1.118278	-1.979554	-1.562545
yhaH	-0.683607	0.30404	-1.594695
atoB	-0.998876	0.308741	-2.377736
yadD	-1.237721	0.428177	-2.882474
yhfX	-0.555831	0.209163	-1.376175
ygfF	-0.935501	0.398545	-2.938112
ycbU	-0.59243	0.121744	-0.855059
rdgC	-0.546215	0.159718	-0.855315
yehR	-0.510131	0.181378	-0.789687

sbcD	-0.13166	0.035412	-0.229514
gmd	-0.898617	0.180703	-1.510787
yebF	-0.321962	0.116915	-0.600063
rcsF	-1.004295	0.321404	-2.035445
ydaL	-0.499178	-0.157551	-1.70424
ycdC	-0.855789	-0.197619	-2.767987
artQ	-0.589113	-0.133398	-1.735327
agp	-0.353408	-0.024409	-0.987665
paaB	-0.649787	-0.033935	-2.018917
yfcH	-1.035084	0.081433	-2.406082
thiP	-1.039313	0.03905	-2.381937
hcaC	-1.464836	-0.028335	-3.280667
ymfL	-0.417188	-0.089156	-0.506019
mraW	-4.902288	-1.363308	-7.036823
nth	-0.752093	-0.147344	-1.135546
tdh	-0.658648	0.009084	-0.961822
yahG	-0.929686	-0.06348	-1.323108
ychM	-1.117527	-0.055341	-1.622
ndh	-1.745657	-0.198534	-2.367908
codA	-1.081606	-0.07025	-1.420757
ydgH	-1.454783	-0.629357	-2.194256
yfaY	-0.663401	-0.264611	-0.965546
ydeM	-0.764653	-0.299263	-1.258412
fadD	-1.331965	-0.465046	-2.219798
yjgJ	-0.830636	-0.390655	-1.441676
yneJ	-0.856562	-0.408254	-1.450657
csgE	-1.171392	-0.574098	-1.983469
ydaS	-0.924535	-0.448123	-1.66453
kdpB	-0.95463	-0.573188	-1.395788
ychE	-2.482884	-1.555022	-4.225431
rof	-0.873796	-0.466194	-1.436694
yliE	-1.306748	-0.495904	-2.557037
citG	-1.131501	-0.524427	-2.323459
citA	-0.564409	-0.123099	-1.055997
yfhG	-1.095478	-0.313456	-2.051838
yciI	-0.594438	-0.08177	-1.089211
yfeG	-0.682838	-0.613928	-2.584519
yfbE	-0.383993	-0.354667	-1.456317
yihR	-0.499876	-0.402881	-1.809584
yecN	-0.359192	-0.245099	-1.289692
hyfC	-0.72738	-0.488783	-2.627547
fecI	-0.796378	-0.573946	-2.914885
hcr	-1.505221	-2.008627	-7.365063
yceD	-0.246978	-0.27254	-1.049286
dctA	-0.604889	-0.686254	-2.677674
yjhB	-0.386912	-0.424668	-1.575771
ydfE	-0.193926	-0.196821	-0.77685
yciK	-1.070385	-1.143449	-4.105048
setB	-0.621281	-0.822678	-2.716962
ydfU	-0.498453	-0.608503	-2.044205
ygcG	-1.03085	-0.923344	-3.014898
sdaB	-0.382074	-0.393461	-1.299978
ydaO	-0.368288	-0.359365	-1.203961
thiM	-0.584604	-0.519207	-1.955471
glgA	-0.417642	-0.75676	-1.806738
ansP	-0.525483	-0.839052	-2.036008
ygbN	-0.880743	-1.446316	-3.746338
ydcW	-0.704248	-0.944187	-2.586943
hemF	-0.588767	-0.750933	-2.157317
yeaI	-0.55721	-0.806946	-2.231889
nfrB	-0.439623	-0.628158	-1.766622

ynfO	-0.410756	-0.499337	-1.375249
yifO	-0.287825	-0.153217	-0.727904
ybcW	-0.406797	-0.206543	-1.037389
yobA	-0.188466	-0.093535	-0.485916
yadC	-0.493927	-0.292022	-1.334871
ynfL	-0.823542	-0.483917	-2.192885
yahD	-1.955595	-1.21976	-5.100254
sufC	-1.458688	-0.939889	-3.777797
speE	-0.756627	-0.532832	-2.124388
yffB	-0.271343	-0.185815	-0.767162
ygbK	-0.480946	-0.315642	-1.437605
ytfA	-0.330604	-0.153778	-0.938935
yfdO	-1.601163	-0.744381	-4.725389
rspB	-0.544489	-0.282613	-1.691946
entA	-0.882872	-0.327612	-2.711454
ydhQ	-0.846677	-0.21864	-2.24292
ymfA	-0.636122	-0.243072	-1.577945
yjeS	-0.336007	-0.1894	-0.706861
ynjH	-1.036742	-0.594047	-2.1648
ytfE	-0.796776	-0.475834	-1.735249
lit	-0.937867	-0.665046	-2.256523
yejE	-0.76571	-0.575187	-1.732102
ybfO	-1.540276	-1.189974	-3.275553
yohN	-0.216847	-0.13892	-0.423184
cobT	-1.300471	-1.590115	-3.840886
hisH	-1.849975	-2.08646	-5.124079
ybfD	-1.312062	-1.525329	-3.636057
icdC	-0.353189	-0.363361	-0.883509
prpD	-2.567608	-2.582126	-6.521262
chaA	-0.407292	-0.39129	-0.984868
yeaL	-0.72797	-0.753401	-1.624589
ydeH	-2.580129	-2.423772	-5.721004
sufE	-1.03104	-0.984015	-2.250119
yeeY	-0.425388	-0.394711	-0.397734
yfeU	-0.923471	-0.873114	-0.80255
moaA	-1.862684	-1.967495	-1.937874
oppC	-0.548901	-0.58247	-0.557836
yecG	-0.818813	-0.91286	-0.914582
ydjN	-0.423023	-0.493841	-0.420539
paaA	-0.43236	-0.399893	-0.51359
yhcC	-0.588956	-0.572925	-0.719785
acnA	-0.847599	-0.835776	-0.945913
ybgI	-0.532141	-0.49457	-0.574321
ydeA	-0.522276	-0.547846	-0.725534
yecJ	-1.17393	-1.218211	-1.570432
ydjM	-0.63321	-0.82855	-0.769089
ygaV	-1.196301	-1.562423	-1.622589
yrfC	-0.595739	-0.792409	-0.779861
ybjQ	-0.916182	-1.384947	-1.34584
yciC	-0.725464	-0.999727	-1.07963
ymjA	-1.077003	-0.817214	-0.979291
pphB	-1.030679	-0.806106	-0.962496
ygcQ	-0.822069	-0.57939	-0.724722
rna	-2.292479	-1.518795	-2.204312
yncC	-0.139202	-0.09287	-0.140241
ycjF	-0.676961	-0.515927	-0.72881
gcd	-0.495541	-0.414849	-0.517679
yqjK	-1.122531	-0.691669	-1.310615
yaiC	-0.473334	-0.351898	-0.597244
yhaB	-0.464592	-0.209195	-0.555636
rnhA	-1.488266	-0.694962	-1.849969

ycdG	-1.026383	-0.498281	-1.234516
ygeL	-0.318899	-0.317359	-0.617139
glk	-3.025319	-3.099183	-6.093192
yecT	-1.267259	-1.409611	-2.438869
yceH	-1.40472	-1.037106	-2.382267
ycgL	-1.209338	-0.93756	-2.030946
nlpI	-2.002614	-1.715961	-3.287056
yfiK	-1.417011	-1.123624	-2.226201
cysW	-1.399442	-1.321713	-2.143543
ykfB	-0.797238	-0.729753	-1.204443
ycfX	-1.734612	-1.593354	-2.597834
torA	-0.616267	-0.524235	-0.937332
rstA	-0.108944	-0.166494	-0.262686
fumB	-0.358659	-0.630259	-0.983132
dusB	-0.73854	-1.277454	-1.97175
aqpZ	-0.820012	-1.415528	-2.32073
yfdM	-0.695825	-1.100891	-1.805189
clpS	-0.597299	-0.960472	-1.372815
ddpB	-0.419574	-0.741229	-1.063436
yehL	-0.805587	-1.385059	-1.936473
ybbO	-1.490344	-2.503394	-3.731198
ydiV	-0.934072	-1.650619	-3.109692
ycbS	-1.173546	-1.799016	-3.539916
idnO	-0.248699	-0.396317	-0.748266
argO	-0.377086	-0.700902	-1.179416
evgA	-0.589817	-1.082806	-1.875814
yciO	-0.616485	-1.163704	-1.992512
yoeA	-0.82156	-1.381731	-2.46554
yeaA	-0.83956	-1.404822	-2.541274
focB	-0.601328	-0.774861	-1.396305
paaH	-0.551914	-0.707856	-1.294938
ybcY	-1.09172	-1.594872	-2.937669
yfgO	-0.852725	-1.081855	-2.189572
gnd	-0.89993	-1.204414	-2.551796
mltC	-0.884658	-1.578458	-1.65334
tehA	-0.448005	-0.90171	-0.920653
yddH	-0.898217	-1.746138	-1.740495
yggG	-0.347182	-0.568485	-0.652566
wcaJ	-1.024688	-1.760404	-2.020851
yeaG	-0.58442	-0.82861	-1.008356
mgsA	-0.73035	-1.091863	-1.257899
yabP	-1.048121	-1.624304	-2.08935
yqjC	-0.360664	-0.589083	-0.726386
ybaL	-0.628675	-0.964951	-1.330701
yfcQ	-1.194932	-1.909122	-2.544009
ygcU	-1.387651	-2.17509	-2.907526
fdnI	-0.43713	-0.812281	-0.959433
yeaE	-0.866083	-1.538976	-1.908674
nanE	-0.474336	-0.837173	-1.044369
csgF	-0.560185	-1.133793	-1.339968
ddlA	-0.524881	-0.994621	-1.293338
yjhH	-0.724543	-0.888573	-1.20073
kbaZ	-1.967883	-2.538933	-3.307613
cbpM	-0.820612	-1.009439	-1.310086
uidC	-0.195103	-0.64016	-0.949301
mppA	-0.393245	-1.162246	-1.779865
ddlB	-0.427118	-1.055982	-1.740444
yedZ	-0.850323	-2.290705	-3.809424
ydgI	-0.780739	-1.948081	-3.059041
mdtF	-1.436925	-3.663733	-5.842197
yeeD	-0.898904	-2.179926	-3.245343

treF	-0.912971	-2.271992	-3.304276
yeiN	-0.36934	-0.915023	-1.342291
csiR	-0.966579	-2.256933	-3.327285
yfcY	-0.573292	-1.671731	-2.018064
ylbH	-0.459909	-1.658231	-2.161888
yceB	-0.626412	-2.093882	-2.70014
ypfG	-0.558009	-1.656855	-2.195813
sseB	-0.7745	-1.832602	-2.533579
ansA	-0.423179	-0.965015	-1.281543
aat	-0.869576	-2.203864	-2.844737
puuE	-0.610246	-1.557216	-2.02288
ycaD	-0.094418	-0.558487	-0.796114
livF	-0.24255	-1.515553	-2.217383
ycgV	-0.151819	-0.97396	-1.475045
hydN	-0.182298	-0.939818	-1.41709
uspE	-0.228304	-1.018771	-1.500431
yghU	-0.241197	-1.078221	-1.535068
yhiD	-0.469335	-2.051016	-2.777943
ypdC	-0.779412	-3.165257	-4.36556
sulA	-0.307004	-2.516463	-3.209021
poxB	-0.174776	-1.699691	-2.320062
yfjO	-0.289221	-2.531898	-3.378468
cspH	-0.229044	-2.23476	-2.991316
tdk	-0.55434	-4.380612	-5.789094
ymfB	-0.468881	-2.048079	-2.408694
yhiK	-0.274536	-1.294391	-1.506841
ynfA	-0.303091	-1.426336	-1.775043
ymcB	-0.080157	-0.501993	-0.617995
ompA	-0.433275	-2.446321	-2.977071
sohB	-0.261595	-1.85959	-2.187784
yjjW	0.600377	0.37296	-1.718857
ycjR	0.337842	0.194472	-0.94936
yhfU	0.220953	0.162786	-0.705015
ymcC	0.252998	0.274454	-0.762816
ccmF	0.759822	0.768817	-2.363893
yceK	0.439918	0.540284	-1.644171
cyoC	0.387222	0.649467	-3.374055
yhfA	0.292405	0.374109	-1.781753
aphA	0.691871	0.7277	-4.179354
ccmG	0.382859	0.349625	-1.685521
yohF	0.47518	0.256661	-2.019603
thrC	1.131171	0.812124	-5.143375
yggS	0.770244	0.537442	-4.882404
artP	0.125092	0.100548	-0.93659
zraP	0.332115	0.180613	-1.718791
pstA	0.520957	0.086334	-4.052305
ypjF	0.169858	0.012632	-1.162272
phnD	0.197323	0.0438	-1.132851
yjiG	0.443876	0.262399	-3.229245
yfjR	0.216157	0.096376	-1.656187
dgoD	0.215118	0.143811	-2.175857
fpr	0.589316	0.176305	-1.441231
ygcN	0.531754	0.136178	-1.219866
torY	0.326857	0.015699	-1.03084
yajO	0.6358	0.004823	-1.827225
yeiG	0.657181	0.055389	-1.78627
xylF	1.232876	0.081959	-3.377932
yfbL	1.132794	0.244743	-3.119969
ampD	1.334004	0.31756	-3.818137
evgS	1.523254	0.261759	-4.326629
fixX	0.428638	0.125134	-1.422262

ybiX	0.629561	0.239193	-2.150492
araG	0.55428	0.208379	-1.655859
bioD	0.235623	0.099803	-0.724229
eutP	0.756521	0.072957	-2.762437
ymgB	0.442829	-0.017989	-1.648762
ykfI	1.326775	0.391951	-5.386184
ygeG	0.379423	0.070302	-1.681625
torC	-0.194523	0.538143	-2.467538
ybfF	-0.117279	0.434284	-1.898102
cobB	-0.083148	0.484529	-1.917569
dnaB	0.007978	0.161777	-0.654209
pstS	-0.041175	1.223342	-4.475331
yhjD	0.175906	0.197703	-2.689287
yhbE	0.194654	0.338901	-3.199047
frwC	0.150372	0.268479	-1.697056
phnH	0.22667	0.470461	-3.149701
ynjF	0.096431	0.34331	-2.305762
yodA	0.028414	0.519484	-2.861019
ecpD	0.08247	0.387214	-2.111766
pdxK	-0.064179	0.521919	-3.277153
eamA	-0.073563	0.032155	-0.34682
ykgK	-0.155273	0.058339	-0.706593
hycB	-0.423158	0.196209	-2.585281
wbbK	-0.183648	0.078955	-1.166269
ybiW	-0.389724	0.084622	-1.551055
yjhC	-0.725271	0.029104	-2.830206
yjgD	-0.257132	0.184715	-2.451659
ydaF	-0.076158	0.074393	-0.896244
mdtC	-0.562145	0.48382	-3.189902
yfdC	-0.387445	0.279114	-2.05928
mtr	-0.208092	0.173523	-1.359963
ydhD	-0.146416	0.157201	-0.925755
eaeH	-0.163489	0.278875	-1.551353
flgN	-0.04275	0.091707	-0.517669
oppF	-0.248364	0.262945	-2.127747
ybbV	-0.083947	0.12029	-0.840558
rem	-0.132304	-0.053713	-0.72383
prc	-0.994382	-0.584111	-5.571682
yadN	-0.668176	-0.352628	-2.965305
feaR	-0.77928	-0.350389	-3.100512
yejB	-0.704691	-0.335697	-2.670974
sfmC	-0.227423	-0.061596	-1.6518
phoE	-0.740901	-0.27586	-4.848414
yohD	-0.107503	-0.00185	-0.703399
gltS	-0.434622	0.024172	-3.388862
glf	-0.259222	0.006925	-1.953677
yaiT	-0.4583	0.001622	-2.153275
hpt	-1.301987	0.045625	-7.018652
yjeJ	-0.432484	-0.130575	-1.960034
ydjR	-0.588593	-0.10832	-2.802029
fbaB	-0.823764	-0.13363	-3.995179
csdA	-0.152399	-0.149262	-0.842101
xapB	-0.927544	-0.858091	-5.006253
ybcF	-0.154215	-0.173464	-0.981922
ypfE	-0.76527	-0.771326	-4.698658
trmC	-0.876222	-0.783122	-5.181514
yraM	-0.428267	-0.350018	-2.777108
eutC	-0.524892	-0.531217	-3.651879
sgcX	-0.136333	-0.173397	-0.805279
yggF	-0.233284	-0.262773	-1.176816
yhdA	-0.53102	-0.451132	-2.462726

cstA	-0.289385	-0.548923	-2.444475
ybjE	-0.105634	-0.189017	-0.935898
cueO	-0.248581	-0.457291	-2.282433
yegW	-0.214455	-0.38289	-1.942632
yneL	-0.627158	-1.002929	-5.018197
yfgC	-0.147373	-0.243121	-1.514983
cspC	-0.423609	-0.843064	-4.385835
ivy	-0.348633	-0.644656	-3.541419
yafP	-0.343472	-0.838257	-4.42643
ybjJ	-0.343091	-0.688872	-2.657778
yafC	-0.289228	-0.607045	-2.453165
narX	-0.16985	-0.379395	-1.358101
uxuR	-0.331618	-0.827849	-2.921155
ybeM	-0.581473	-1.146509	-4.201837
appB	-0.049592	-0.044296	-0.864071
eutT	-0.25766	-0.141602	-2.936787
fiu	-0.044042	-0.087159	-1.688736
nemA	-0.066396	-0.131796	-1.714438
xapA	-0.189536	-0.399847	-3.308728
flgK	-0.060406	-0.170399	-1.185267
ycfS	-0.117053	-0.459368	-3.421677
cdaR	-0.199246	-0.239961	-2.407272
nlpE	-0.156289	-0.20582	-2.117046
fhuA	0.191329	-0.072923	-2.802765
yjeN	0.30155	-0.135424	-3.709118
recA	0.392391	0	-4.245137
tgt	0.774231	-0.058672	-7.764998
nlpD	0.34903	-0.285827	-4.157483
ydhU	0.235125	-0.155245	-2.444751
bcsB	0.055826	-0.135155	-2.726328
mtgA	0.015243	-0.063773	-0.628409
pspF	0.121449	-0.278018	-3.47581
ybfQ	0.168516	-0.432508	-6.096817
menB	0.009638	-0.146477	-1.927413
emrE	0.283719	-0.236762	-7.959477
ydcS	0.073616	-0.022713	-1.796375
nrdF	0.036606	-0.013681	-2.783244
rnhB	-0.12216	0.106375	-3.753809
ybeR	-0.028788	0.046001	-1.291443
cls	-0.153409	0.110361	-3.052643
cspB	-0.15504	0.020288	-4.693884
rumB	-0.030925	0.005068	-2.397595
yqjH	-0.038279	0.286135	-4.219335
ycdR	0.100894	0.375246	-7.334028
yegT	0.073426	0.30512	-4.312773
ylcG	0.646087	-1.10326	-10.557167
zupT	0.18143	-0.423389	-2.924683
mdaB	0.139736	-0.385812	-2.434438
arsR	0.126062	-0.27955	-2.14519
kdpA	0.117159	-0.369691	-2.68924
dppC	0.270295	-0.288172	-1.866428
ydcI	0.231435	-0.433958	-2.342461
dkgB	0.420266	-0.588388	-3.420927
maeB	0.556591	-0.658413	-4.990005
garP	0.243461	-0.290265	-2.338885
ybjS	0.034321	-0.359857	-1.590522
ygeF	0.107712	-0.704546	-3.201964
araJ	0.340881	-1.892264	-7.937542
htgA	0.222124	-0.583714	-2.823011
oxc	0.393811	-0.847068	-4.016585
rusA	0.895108	-2.187366	-9.474009

amiA	0.222802	-0.514429	-2.272621
ybgK	0.277358	-0.743753	-3.190192
ulaC	0.454688	-1.162714	-5.097295
yggP	0.183497	-0.601084	-2.696924
yaiW	0.135385	-0.466615	-1.986296
phoR	0.20156	-0.800687	-3.78792
mglA	0.164936	-0.536332	-2.942571
yedV	0.303496	-0.941706	-4.92101
yjbR	0.488753	-0.55567	-2.1166
smpA	0.664735	-0.715167	-2.863646
dsbC	0.305492	-0.366147	-1.446501
yadH	0.956602	-0.975171	-3.48485
yqjB	0.877828	-0.790425	-3.221125
yahL	0.315567	-0.256296	-1.30425
pdxY	0.522408	-0.592072	-2.593946
yfiA	0.210567	-0.19586	-1.005354
hisF	0.230362	-0.222372	-1.082375
araE	0.349885	-0.473262	-2.139818
yiaM	0.930264	-1.086866	-5.389383
yfeA	0.66786	-1.08612	-3.529823
ygcW	0.679946	-0.96404	-3.256575
yihS	0.503907	-0.821398	-2.876047
yiaT	0.526027	-0.795209	-3.011652
xdhD	0.718761	-1.710541	-5.987452
qor	0.546787	-1.102527	-4.268301
yidL	0.475331	-0.893502	-3.327008
yajB	0.646622	-1.300407	-4.71176
ibpB	0.471523	-0.830035	-3.202326
bioA	0.513059	-0.876087	-3.631305
norW	0.445834	-0.099938	-2.917721
lpxA	0.551478	-0.174177	-3.427812
ykgE	0.420895	-0.154078	-2.734232
eptB	0.270989	-0.086418	-2.091295
idnK	0.099829	-0.02535	-0.834333
flgF	0.154528	-0.093806	-0.912165
yaiA	0.367228	-0.219065	-2.325829
ydcH	0.817205	-0.591819	-5.243802
hybB	0.593403	-0.267469	-3.238158
ybiA	0.515369	-0.172186	-2.837944
yddJ	0.235732	-0.104418	-1.033794
yliF	0.674429	-0.182628	-2.849906
mhpR	0.484876	-0.250083	-1.980995
ebgA	0.575115	-0.353332	-2.488823
yjeM	0.588931	-0.339469	-2.47903
aroL	0.985642	-0.736054	-4.752334
hyfB	0.73138	-0.52392	-3.471252
yiaB	0.702991	-0.505329	-3.034123
pfkB	0.525913	-0.377357	-2.342668
ybbA	0.370626	-0.26836	-1.652677
yafW	0.904934	-0.633477	-4.726735
bcsF	0.525796	-0.272824	-1.834168
elaD	0.367979	-0.203802	-1.384063
yhjK	1.137667	-0.515969	-4.191309
dam	2.892216	-1.521134	-8.319112
tfaE	0.540146	-0.248049	-1.501843
yiaO	1.062189	-0.482745	-3.250163
rffE	1.224641	-0.450912	-3.665224
ykgI	0.848625	-0.313364	-2.360415
mtlD	1.076508	-0.326294	-3.440037
intB	0.344509	-0.264445	-1.115077
ypjA	1.097344	-0.927311	-3.576515

btuR	0.749746	-0.517967	-2.456017
ybiY	0.989227	-0.677924	-3.279638
yffH	0.88159	-0.570461	-2.536062
ycgN	0.821939	-0.562446	-2.34066
elbA	0.263237	-0.18866	-0.777401
ynjC	0.58427	-0.283792	-1.354108
ygfO	1.24151	-0.490163	-2.77915
yhhL	1.824149	-0.990993	-4.554227
gltI	1.131528	-0.69533	-2.948054
livJ	0.920639	-0.538071	-2.380457
phnC	0.700812	-0.447458	-1.478026
rluC	0.322819	-0.211849	-0.636228
yiiT	0.268428	-0.234426	-0.621679
yhaC	0.306604	-0.210978	-0.756521
ydhR	1.079552	-0.873455	-2.658085
yohJ	0.248554	-0.187803	-0.598588
yebZ	0.879125	-0.667537	-2.121845
yaiL	0.659386	-0.525996	-1.530264
yidI	1.286595	-1.213878	-2.727706
ybbJ	0.250683	-0.215055	-0.497528
zraR	0.473116	-0.513923	-0.997653
ytfJ	0.621038	-0.616103	-1.263185
aidB	1.01927	-1.02929	-2.033531
ilvA	1.558802	-1.597594	-3.607755
yiiF	0.756241	-0.857856	-1.872942
arcA	0.757819	-0.782646	-2.431923
cysI	0.999037	-1.223389	-3.289439
idi	0.550792	-0.686741	-1.896646
ugpC	0.762391	-1.151451	-2.961613
pdhR	0.71132	-1.007611	-2.606704
ybcN	2.136823	-2.82355	-8.695819
ugpA	0.649481	-1.078217	-2.902378
ykgG	0.429732	-0.777125	-2.295835
ybgH	0.322774	-0.475265	-0.973818
yaaH	1.019847	-1.277285	-2.92039
rhlE	1.190776	-1.572659	-3.525183
ygcK	0.252514	-0.360408	-0.815056
yliG	0.756725	-1.064993	-2.317607
ygjQ	0.41174	-0.454935	-1.223032
yehQ	0.694354	-0.851952	-2.095795
cpxR	0.889195	-0.957777	-2.322572
yjhX	0.796293	-0.93446	-2.151524
eutQ	0.722721	-0.863878	-1.968177
yqaB	1.399935	-1.626618	-3.885461
ytfG	0.328978	-0.507385	-1.180372
yfdN	0.220671	-0.337272	-0.80318
yidF	0.808956	-1.326671	-3.039874
glcD	0.794417	-1.39742	-3.26447
ybgL	0.560933	-0.962578	-2.019561
frlA	0.423653	-0.665817	-1.434003
uhpA	1.274353	-2.619979	-5.681317
dsbG	0.443491	-0.960509	-2.081266
yhiJ	0.521041	-0.997954	-2.127082
yaiB	0.304612	-0.576185	-1.187445
alsC	0.374761	-0.685722	-1.230099
sfcA	0.377181	-0.641144	-1.213976
ygcH	1.119961	-1.849198	-3.51596
yjiX	0.83927	-1.535979	-2.918453
rbsK	0.597737	-1.053144	-2.095124
mobB	0.967069	-1.731752	-2.980465
rfaZ	0.731664	-1.382594	-2.340362

mhpC	0.666384	-1.128537	-1.938801
yedW	0.972876	-2.013008	-3.481892
yegH	0.429899	-0.85716	-1.700884
guaD	0.66376	-1.387378	-2.612264
yicC	1.401866	-3.542794	-6.533646
fucP	0.331194	-0.813295	-1.489141
eutG	0.61659	-1.515252	-2.786935
bax	0.551929	-1.336888	-2.373181
aroP	-0.440151	-0.771872	-1.626986
ptsI	-0.296305	-0.682639	-1.420454
queA	-0.389261	-0.845175	-1.634548
ulaE	-0.314631	-0.689851	-1.356535
ygdB	-0.386749	-0.967602	-1.820424
ushA	-0.734151	-1.718139	-3.194774
ypdH	-0.980278	-2.510068	-4.876351
frlB	-0.212433	-0.982857	-1.672666
ybiM	-0.552234	-2.572746	-4.337574
ycdQ	-0.260579	-1.090597	-1.731567
syd	-0.291203	-0.908859	-1.507845
ybgJ	-0.609439	-1.700717	-3.063501
sohA	-0.186403	-1.949963	-4.254771
yjhR	-0.062816	-1.498441	-3.294006
yjeO	-0.098038	-1.534723	-3.70501
ygeO	-0.028623	-1.468538	-3.786567
ycgY	-0.018235	-1.432455	-3.512081
bcsE	0.021592	-1.455767	-3.575346
hupB	-0.704415	-2.968533	-5.950838
argC	-0.31823	-1.15231	-2.362592
yqiG	-0.413538	-1.476231	-3.071049
yjhG	-0.234987	-0.916755	-1.736366
yehA	-0.259002	-0.990314	-1.911107
metA	-0.07768	-0.640054	-1.198171
fdnG	-0.038222	-0.302259	-0.572442
yeaH	-0.260636	-1.339229	-2.514998
mdtH	-0.351354	-2.090381	-4.327928
sspB	-0.128643	-0.863402	-1.794693
yijE	-0.112279	-0.717873	-1.488035
rtcR	-0.352825	-1.905358	-3.8562
cysP	-0.300829	-1.579637	-3.249338
puuR	-0.215851	-1.184939	-2.357356
pncB	-0.141613	-0.897135	-1.761274
ycgK	-0.994012	-2.726333	-5.72447
yedK	-0.498263	-1.359722	-3.017492
feoA	-0.252468	-1.039567	-2.262332
ycgF	-0.272776	-0.977329	-2.193865
tdcB	-0.388513	-1.245671	-2.965549
fabR	-0.546914	-1.797205	-4.367362
fumA	-0.419524	-1.380141	-3.337755
ybgE	-0.30156	-0.645479	-2.022785
yaiI	-0.839899	-1.66812	-5.263702
yieN	-0.293563	-0.541855	-1.676009
ilvH	-0.367526	-0.662366	-2.023586
yqeG	-0.599492	-1.14479	-3.462543
nagD	-0.397523	-0.706523	-1.994967
puuP	-0.542499	-1.219292	-3.259231
yccF	-0.506942	-1.010575	-2.633577
ogt	-0.133919	-0.740598	-1.880099
talA	-0.184993	-0.979735	-2.456018
yneG	-0.253102	-1.529266	-3.940203
yicI	-0.292321	-1.504101	-4.200849
yjiH	-0.29417	-0.985166	-2.600143

cybB	-0.493112	-1.583929	-4.247744
ydcK	-0.407624	-1.131384	-3.25376
cutC	-0.259216	-0.738519	-2.06137
umuC	-0.291163	-0.791252	-2.179517
ybjH	-0.250975	-0.716759	-2.184852
yhfY	-0.689231	-2.375843	-7.294127
manZ	-0.023691	-0.082467	-0.237262
hypE	-0.087385	-0.552923	-2.066372
yjgN	-0.040215	-0.407771	-1.594656
cmtA	-0.013825	-0.145892	-0.610623
yedF	-0.017156	-0.168661	-0.743741
hcaR	0.006348	-0.744432	-3.343488
mazG	-0.069414	-0.333156	-1.669323
pepD	-0.180577	-1.374001	-7.228364
nagB	-0.165794	-0.500364	-2.83709
nirD	-0.089437	-0.402411	-1.251664
yjgZ	-0.105901	-0.720822	-2.271452
thiE	-0.168631	-1.191724	-3.631168
ybhD	-0.085102	-0.446098	-1.464148
gltK	-0.149998	-0.966409	-3.321223
araH	-0.252812	-1.20951	-4.257733
yrhA	-0.063647	-0.320476	-1.107145
yddL	-0.06396	-0.755687	-2.355571
sgcR	-0.03227	-0.42006	-1.375249
cynX	-0.097051	-1.210698	-4.064262
prpE	-0.578498	-2.094814	-7.888435
ybjD	0.013008	-0.327879	-0.96676
yhjA	0.030833	-0.813348	-2.447012
yihI	-0.017211	-1.41458	-3.908722
yiaU	0.051647	-1.579004	-4.379106
ymgG	-0.12119	-1.398074	-4.005779
kptA	-0.070471	-1.212068	-3.367459
yacC	0.093874	-0.783186	-2.501848
ycgZ	0.127119	-1.126829	-3.559811
fliL	0.045519	-0.411535	-1.350405
prfH	0.046537	-0.335608	-1.130202
hyfR	0.135916	-0.820025	-2.757703
ybeU	0.050549	-0.625981	-2.233798
yohM	0.02618	-1.270194	-4.575316
hcaD	0.023583	-1.114669	-3.622434
ycjY	0.036401	-0.912942	-3.157812
mdtA	0.022676	-0.730194	-2.453974
ybjI	0.117177	-0.356621	-1.389021
yraP	0.213073	-0.902717	-3.258118
gudD	0.242955	-0.914367	-2.883922
trpE	0.143217	-0.703962	-2.277102
yhiQ	0.195301	-0.917308	-2.001457
yjbI	0.083326	-0.375427	-0.851336
hofB	0.201659	-0.831552	-1.8989
pphA	0.071577	-0.289718	-0.659424
yggM	0.205961	-0.790523	-1.752628
ygjN	0.272524	-1.103576	-2.418461
zitB	0.322398	-1.936476	-4.015299
ydjE	0.273795	-1.393883	-2.858743
ybhP	0.198929	-1.429465	-3.02239
yicS	0.468666	-1.626257	-3.365274
ydeN	0.346738	-1.370298	-2.621769
avtA	0.494042	-1.215754	-2.751332
ybhF	0.453671	-1.527616	-3.382067
ygjG	0.14635	-0.421118	-0.956198
ltaE	0.391473	-0.956824	-2.458911

nikE	0.601327	-1.481948	-3.787845
htrC	0.430207	-0.956962	-2.462213
yfhK	0.695139	-1.536481	-4.065032
livH	0.604851	-2.15515	-5.154818
yegX	0.274542	-0.856125	-2.172251
deoB	0.14586	-1.452918	-3.614882
ydcV	0.121803	-0.918382	-2.075195
ylaC	0.315326	-1.857804	-4.461169
yjiJ	0.26427	-1.495312	-4.219681
ybhC	0.229562	-1.403397	-3.913155
ybcO	0.695597	-4.266628	-11.359678
xthA	0.185244	-1.163961	-3.084351
yfhM	0.31732	-1.699758	-4.630617
gntU	0.080195	-0.352156	-0.905617
ytfT	0.411589	-1.25897	-3.348624
lyxK	0.240523	-0.761545	-2.100866
ygjR	0.252737	-0.829274	-2.407554
proA	0.220521	-0.724852	-2.095784
torZ	0.114793	-0.45732	-1.334469
ygiL	0.232442	-0.57891	-1.720079
pbl	0.239461	-0.617793	-1.980234
ymgF	0.237817	-0.685313	-2.082285
yjeK	0.333422	-3.388549	-3.822846
hisQ	0.213361	-1.445304	-1.694888
polB	0.067778	-0.934776	-1.187685
nadC	0.153402	-2.195722	-2.689232
fhuB	0.012884	-0.168399	-0.203234
ninE	0.543442	-5.378735	-6.517067
caiA	0.117628	-1.247615	-1.522553
ybfA	0.024958	-0.943762	-1.098051
ygeP	-0.062351	-1.988054	-2.33812
yiiQ	-0.009615	-1.830231	-2.192732
topB	-0.090593	-2.487503	-3.163388
rpoS	-0.070273	-1.359537	-1.709121
hupA	0.530061	-2.379665	-2.781653
ybeQ	0.105014	-0.540662	-0.623714
hslV	0.70005	-2.480344	-2.836197
pppA	0.414239	-1.735499	-1.86061
xylR	0.60096	-2.021074	-2.65886
yfbQ	0.247266	-0.845902	-1.115514
phr	0.4544	-1.850578	-2.521107
yjfY	0.231776	-0.95378	-1.161835
yfiD	0.365458	-1.480774	-1.894464
yhbG	0.407261	-2.182192	-2.846249
trkD	0.239482	-1.310909	-1.710992
kch	0.335818	-1.651159	-2.118444
torR	0.555264	-1.45139	-2.051963
fieF	0.337953	-1.090562	-1.591155
metN	0.645726	-2.011938	-3.020633
ypfH	0.458757	-1.544901	-2.313693
speC	0.338225	-1.28635	-1.874666
yebN	0.665785	-1.637606	-2.62463
yhdU	0.405152	-1.143879	-1.76745
ansB	0.583443	-1.647131	-2.526977
ygbM	0.308652	-0.913291	-1.414421
lpp	2.817322	-7.336159	-11.346269
ccmE	0.115925	-0.313434	-0.468216
yhiR	0.351013	-0.990537	-1.613219
yfeK	0.253352	-0.799191	-1.34359
emrA	0.127576	-0.488543	-0.79916
ycdL	0.388566	-1.432931	-2.383261

eutA	0.282718	-1.075581	-1.710683
kduI	0.158333	-0.954772	-1.468072
hokE	0.132409	-0.909268	-1.464382
yraN	0.304435	-1.580602	-2.260472
yphF	0.275608	-1.450295	-2.127017
intS	0.665018	-2.90943	-4.317314
glxR	0.326406	-1.535161	-2.3292
prlC	0.240689	-1.956956	-2.72614
bcsA	0.291303	-2.58845	-3.663345
yghO	0.327605	-2.651331	-4.722279
yeeJ	0.114426	-0.878945	-1.51491
yhgG	0.131317	-1.655843	-3.315672
yjhI	0.110802	-0.997569	-1.931067
yaiZ	0.314486	-2.890613	-5.570829
upp	0.361509	-2.372077	-4.492745
hyi	0.163842	-1.109746	-2.084007
rimK	0.057679	-1.620837	-3.150312
hyfF	0.088602	-2.896142	-5.504624
yjiD	0.067118	-0.929378	-1.604056
yfdX	0.074939	-2.325626	-4.105173
yehD	0.086585	-1.551667	-2.759478
ypfI	0.122381	-1.91426	-3.473759
dhaR	-0.003601	-1.727032	-3.057868
narW	0.158929	-2.024096	-3.194558
uidB	0.030223	-0.497646	-0.757973
yjiY	0.127919	-1.739142	-2.660892
ygeH	0.103986	-1.31668	-2.030922
yedD	0.094182	-1.87458	-3.011846
yhhH	0.069855	-2.20789	-3.405415
helD	-0.076754	-1.963964	-2.793206
ydiB	-0.029166	-0.847842	-1.202418
nrdG	-0.157194	-2.457163	-3.666642
ymfO	0.001415	-0.708356	-1.047006
yjjP	-0.131999	-1.060512	-1.895329
cysJ	-0.559485	-3.526433	-6.226529
ygiU	-0.272398	-1.877435	-3.173958
mutY	-0.199596	-1.800619	-3.031315
yfgL	-0.244059	-2.011848	-3.186369
yjjV	-0.12499	-1.133198	-1.742871
yceO	-0.107573	-1.324149	-2.085682
ybbC	-0.101106	-1.27887	-2.006467
argG	-0.048751	-1.64212	-2.665017

Table S7. Significantly sensitive gene mutants in the presence of keyicin, Ethidium bromide (EtBr), and methyl methanesulfonate (MMS)

Keyicin 12.5 µg/mL			EtBr 100 µg/mL			MMS 0.0125%		
GENE	**fold-Change**	**Adjusted P-value**	**GENE**	**fold-Change**	**Adjusted P-value**	**GENE**	**fold-Change**	**Adjusted P-value**
prc	0.471517469	0.000193446	acrA	0.03900458	1.69464E-37	recA	0.014825568	1.33E-56
sapF	0.481388022	0.045127861	acrB	0.056503908	5.42582E-44	recA	0.054774353	8.68E-17
nlpI	0.511739137	0.028754677	lpp	0.065730478	4.45062E-15	acrB	0.055728656	5.91E-84
metA	0.539455401	0.0019362	lpp	0.072528038	2.11043E-26	acrA	0.088818949	1.40E-51
wzxC	0.550850365	0.048721221	ninE	0.08687639	1.55476E-39	acrB	0.127156263	1.11E-24
dsbB	0.552327707	0.000714636	yhcB	0.095359371	5.54789E-07	yrbF	0.14732306	3.08E-40
ihfA	0.563134603	3.62966E-05	rusA	0.107596707	1.20149E-27	rfaQ	0.160337762	2.67E-37
ydeT	0.573863681	0.00023457	acrB	0.115913283	9.44772E-21	rfaQ	0.173836199	5.36E-30
treC	0.575820972	0.013652674	nlpI	0.155580863	2.27753E-08	kdpD	0.185291851	3.06E-17
fadR	0.582190494	0.031554405	ycdR	0.156963933	2.85949E-11	recR	0.218956863	0.000103057
ihfA	0.58909844	0.031073933	prc	0.158843774	1.39173E-17	yrbD	0.224315078	8.51E-14
ihfB	0.591119587	0.001566314	tolC	0.160889179	0.002465329	yrbB	0.229871053	9.34E-23
gcvH	0.592732575	0.022256965	dam	0.161753169	4.39291E-16	tolC	0.234705093	0.004576335
solA	0.59437474	0.049321823	araJ	0.171537786	7.48227E-10	yrbC	0.23899238	2.91E-15
prc	0.60345449	0.004794452	ylcG	0.171868199	2.8877E-11	yrbD	0.239513682	1.44E-12
yeaU	0.604525594	0.017056394	yggS	0.184166551	1.87183E-11	vacJ	0.243792788	1.62E-19
nlpI	0.607674899	3.62966E-05	ybcO	0.18470459	3.03226E-08	narQ	0.244187234	2.91E-15
trkA	0.609361082	0.014064958	recA	0.19105869	1.45121E-17	asmA	0.259374075	0.001961592
yeaX	0.610175858	0.045863199	prc	0.191612222	1.16732E-10	ruvC	0.260538877	0.0012043
deaD	0.619704159	0.016578432	hpt	0.192586395	3.74883E-12	ydcQ	0.262978504	1.81E-07
dsbB	0.622165886	0.012632819	hcr	0.193698439	2.72225E-18	ybhT	0.283508161	5.50E-16
ycbQ	0.624261089	0.027297225	ybcO	0.197070065	1.67855E-10	rseB	0.287659593	4.66E-13
clpP	0.625832305	0.024178968	ylcG	0.199374794	5.48485E-15	ruvB	0.288219161	0.005803723
flgJ	0.62823942	0.013652674	ybcN	0.200873437	2.00382E-12	phoP	0.291954009	2.08E-08
slyA	0.629751278	0.038708273	prpE	0.202414809	1.82823E-18	vacJ	0.303620567	5.98E-12
speE	0.632819452	0.022256965	sohA	0.214476837	1.50549E-34	alkA	0.303760332	3.08E-10
gatZ	0.635022144	0.017712278	rpoS	0.217324751	0.002293154	recB	0.312653103	1.04E-07
ynfE	0.642925781	0.007787069	ybcN	0.218837965	1.20678E-13	phoQ	0.312765974	0.000725538
potC	0.648485921	0.013965983	ilvH	0.219186542	1.67276E-26	ruvA	0.331080869	0.000103057
fimA	0.649394462	0.012447265	yafM	0.223227678	8.84737E-25	holC	0.33215226	2.24E-06
ydaT	0.653923953	0.019317657	barA	0.225820107	1.48645E-36	recO	0.335910211	3.06E-17
melB	0.654467553	0.033893625	yqjH	0.228209376	1.2049E-06	phoQ	0.338007585	4.59E-07
ydfZ	0.655946017	0.049602142	cysJ	0.228273973	2.27324E-07	dnaQ	0.343778225	0.000948631
yjjZ	0.666144153	0.039695786	rffE	0.230050424	3.28157E-10	recB	0.352768171	0.000140233
puuC	0.669559451	0.045863199	sspA	0.232236634	1.95544E-18	rfaI	0.361882668	2.68E-09
tam	0.669881271	0.033879985	fis	0.233084764	2.55733E-16	tig	0.362099988	4.73E-10
fimF	0.675259638	0.014226575	fhuC	0.235074514	2.0007E-07	yfgL	0.364897755	0.000112385
ydhP	0.676912698	0.028974795	sufD	0.235351384	0.000851426	yhcB	0.366000331	0.023264182
ydhV	0.678827097	0.039736233	emrE	0.236476555	3.73301E-06	rfaH	0.369022931	0.001149981
otsA	0.680531574	0.03532254	ygeL	0.239563967	0.001947257	asmA	0.370079762	9.15E-06
glk	0.680980575	0.012732629	mtlD	0.243059723	3.50319E-14	rfaG	0.374756755	0.000112385
yodB	0.68461849	0.041761221	nlpI	0.245066858	1.84747E-24	hrpA	0.381210917	0.01140988

ygdD	0.688517748	0.036825301
dcd	0.69043265	0.048721221
ydeK	0.695100494	0.041872712
narH	0.701927206	0.04220949
rfbD	0.703296338	0.019317657
mdoB	0.704407132	0.049602142
rep	0.710643977	0.04008128
sgcC	0.73265457	0.041072785

yhiD	0.246216618	6.96835E-20
thrC	0.24887471	3.55411E-06
ypdH	0.250000905	2.62026E-16
yahD	0.255641026	1.78525E-24
ulaC	0.259325032	6.10867E-06
lpxA	0.260828769	2.66373E-48
pstA	0.261627213	3.23768E-16
dam	0.26489758	6.48515E-15
ugpC	0.269089286	1.6057E-12
rpoZ	0.272753818	2.19566E-28
rusA	0.273074185	3.46758E-17
intS	0.273475473	4.94981E-09
kdpD	0.275446087	3.239E-13
tdk	0.275997383	9.29034E-25
sspA	0.276243533	1.11794E-17
yaiI	0.277845064	3.1714E-06
xylF	0.277849986	5.28052E-05
ygfF	0.28121398	1.14507E-16
ynbC	0.281258717	0.008519679
uxuR	0.281479753	1.09241E-16
fhuA	0.282189745	1.14507E-16
tig	0.282643985	4.45867E-15
mdtF	0.287034602	7.46587E-13
bcsA	0.287315904	1.67218E-15
sgcE	0.288771287	7.83225E-05
hcaF	0.291034725	3.89442E-11
yhfY	0.294226479	2.01344E-05
phr	0.29457872	0.001885106
recA	0.295393605	2.75735E-05
yggS	0.296637207	0.000194885
eutT	0.298515477	8.95358E-14
rcsF	0.299229295	2.40682E-17
oxc	0.300024469	1.78651E-07
hupB	0.30003565	0.00019865
yafW	0.302093158	4.50692E-07
ybbC	0.303809681	0.000206537
tgt	0.303947323	1.58338E-06
prpD	0.304796049	5.26273E-10
yiaM	0.308942902	3.57389E-08
yeeD	0.3107854	2.41233E-10
rfaF	0.312445469	0.002096148
yicC	0.312460751	1.24104E-16
rseB	0.314470832	5.12525E-09
yfiQ	0.314762552	3.11382E-13
pepD	0.316640444	0.003365984
ushA	0.316680356	4.12265E-07

ompA	0.38527099	0.000274037
yhhF	0.39048933	0.009516876
yrbC	0.39195006	1.31E-07
yrbB	0.394911168	1.57E-06
phoP	0.407948463	0.002685211
narQ	0.408821679	1.32E-11
rfaY	0.409542379	0.000499703
recE	0.42263939	4.67E-07
potA	0.423681492	0.00147019
yjeK	0.427651533	1.70E-08
galU	0.428829384	0.036142093
ptsP	0.434907502	7.25E-06
ydfV	0.435879444	3.21E-06
ybjX	0.442894608	0.000146373
recG	0.448432626	8.05E-10
rpoZ	0.453387715	1.14E-09
sgbU	0.461236518	4.42E-08
sspA	0.465969753	3.07E-05
recT	0.466155142	0.000715558
baeS	0.46881543	1.33E-05
sspA	0.469927773	0.000841994
dinJ	0.475603019	3.67E-06
yfgL	0.476396883	0.00699311
yrbG	0.489377026	8.51E-05
ninE	0.491819994	3.33E-08
ybjX	0.492812879	0.001669826
hupA	0.501677739	0.033475655
recG	0.50290046	3.34E-05
rseC	0.50435804	9.58E-05
dinJ	0.506240153	7.62E-09
potB	0.510664676	0.009910952
rpoZ	0.51265701	0.045494928
hyfI	0.514004635	0.02921961
rssA	0.515592227	0.002265439
nagA	0.518321242	0.000152245
purR	0.519684741	1.63E-07
fimE	0.528221921	0.024441254
rseB	0.529829667	0.000514483
hupB	0.533865643	0.036464705
ybcO	0.540644245	0.009010278
hrpA	0.541971334	0.00276088
ruvA	0.546115442	0.042154256
cpdA	0.548310314	0.018188256
recF	0.548564605	0.009108748
yeiU	0.550522736	0.008945005
dipZ	0.552326273	0.001285173

yjgJ	0.317266419	1.63919E-15	rph	0.553714375	8.76E-05
relA	0.320208605	2.80697E-09	yhbG	0.553731985	0.005775387
ycdC	0.320336946	8.46464E-13	hlpA	0.556461495	0.002266774
ycjT	0.32042499	0.011199241	ybcO	0.561226267	0.000414286
ybfQ	0.321280156	0.000234581	nlpI	0.562559715	0.043154248
ybhC	0.322195975	2.70224E-11	ptsP	0.564525386	0.005976205
yajB	0.322404647	2.00677E-13	ybhT	0.564712542	0.00217712
recB	0.322522501	1.36218E-07	yhiL	0.566615046	0.005175817
sbp	0.322718584	6.95931E-11	yrbL	0.567713564	0.006372764
aphA	0.32358897	1.51516E-06	acrE	0.571958821	0.008401648
tgt	0.325031082	1.71975E-09	yifE	0.575481278	0.000146373
yadD	0.326421897	3.77151E-14	pepT	0.575770532	0.028976392
dinI	0.329922699	3.66699E-15	ygiU	0.57711283	0.029403186
bcsE	0.330165988	0.00025954	qseC	0.57877566	0.021898324
yfjY	0.330834996	5.35221E-15	prc	0.579780104	0.044714072
trmC	0.33092766	5.84666E-13	yiaY	0.582568023	0.017237479
yneL	0.332094493	0.000181098	ptsG	0.590770741	0.002630297
mdtH	0.332159386	4.38464E-13	dedA	0.590825334	0.015873156
ompA	0.333545623	1.21259E-06	npr	0.598088878	0.000862832
xapB	0.333756359	9.76079E-13	acrE	0.599601626	0.013928004
frsA	0.335028241	1.32872E-14	hslU	0.602237913	0.037447144
qseC	0.336161971	0.001121274	prc	0.605103803	0.015273474
gnd	0.337118236	1.44117E-08	nudC	0.607731132	0.00179869
yjbI	0.33839456	3.70884E-15	ihfA	0.60932722	0.040000001
yqaB	0.339559667	9.12946E-06	ypjM	0.613172715	0.009228534
sulA	0.339570138	3.93771E-10	hsrA	0.618855647	0.013928004
yfiK	0.340819828	0.000707716	alkA	0.619640228	0.039729351
yicL	0.340842117	3.16853E-10	hlpA	0.62047431	0.006356242
ibpB	0.340848844	3.49457E-16	amyA	0.620694443	0.019452533
narQ	0.341373782	3.21473E-10	npr	0.622159152	0.019245484
ybdL	0.341524049	6.95931E-11	yahM	0.622965327	0.013996766
yfgL	0.341756862	0.001024298	miaA	0.62630793	0.001775685
ypdJ	0.342190863	0.02893266	ynfP	0.628444939	0.038400033
pstS	0.342544478	3.42115E-10	glyA	0.641430808	0.035633401
ybiS	0.343146228	0.000336738	ybbB	0.643912412	0.028976392
fhuB	0.343374744	1.72547E-21	nudC	0.648991783	0.006053931
yjeN	0.343676699	4.10524E-08	exuT	0.653032224	0.011736812
yciK	0.344094701	3.31761E-08	mpl	0.654522142	0.011491543
yqjB	0.34491264	7.82271E-09	dam	0.65676536	0.038812809
deoB	0.345026839	1.24287E-08	ydfV	0.660367411	0.034578615
yhjD	0.345354002	1.42006E-12	mrcA	0.664266553	0.04904757
ydeH	0.345843355	6.27315E-11	idnR	0.664322295	0.020023175
upp	0.350710525	1.6456E-10	mraW	0.664586179	0.0001213
phnH	0.351068581	2.50604E-15	mraZ	0.670402811	0.02370528
yicC	0.35244647	7.6657E-10	yecP	0.671751706	0.00433934
yjeK	0.354334237	1.52853E-08	potD	0.672981452	0.043154248

yjgM	0.354397862	2.33328E-05
hyfF	0.355252015	1.49E-07
ymgG	0.357055524	3.70309E-06
ycgY	0.357445641	8.01951E-05
ynfN	0.357567594	2.39043E-12
hupA	0.358634908	2.98124E-17
intF	0.358636883	1.83856E-12
prpE	0.35951331	1.07214E-11
mutS	0.359541869	5.3776E-13
fecD	0.359712338	0.012993278
yfgL	0.359959129	0.000686144
ygfO	0.36107676	8.41552E-06
glk	0.361369861	2.40143E-09
cysP	0.361516961	2.27706E-10
xdhD	0.361565066	0.000166814
uhpA	0.361715868	6.28307E-11
glgP	0.364183557	6.28466E-10
deaD	0.365051156	1.09269E-07
zupT	0.365189939	2.12039E-11
prfC	0.366540214	0.007595385
yfdO	0.366615921	6.7149E-08
yejB	0.366781594	3.50006E-07
ycfS	0.367467058	3.67145E-07
araH	0.367563268	0.00013068
rpmJ	0.368402666	0.000580551
yibN	0.369145435	1.81265E-07
bcsB	0.369786332	1.24207E-10
pppA	0.370588963	0.002669883
atoB	0.370663663	2.18986E-11
yafP	0.37140824	6.1352E-07
yceH	0.37219754	2.85148E-07
yedV	0.372831312	0.000130999
thiE	0.372921922	1.38905E-09
yhjK	0.373106286	2.38762E-13
yjiJ	0.373295423	4.8165E-11
yhbG	0.373901858	3.04365E-08
rpmE	0.375433486	1.57915E-05
atpF	0.37578502	0.002213974
fis	0.375906865	5.7219E-09
ygjN	0.376436929	1.17762E-11
ssnA	0.376750977	0.013833113
ycfM	0.377081685	3.96765E-09
xapA	0.378459247	1.74819E-08
tesB	0.378884687	3.41242E-08
ygeO	0.379775443	1.48846E-09
yfhM	0.379907777	0.000205734
yrbG	0.673370677	0.045494928
pepN	0.673648296	0.010516694
hupB	0.675703402	0.029824075
osmY	0.679477846	0.006180898
rusA	0.679814686	0.045494928
marA	0.685249122	0.021282482
ihfB	0.686543774	0.010516694
yfcX	0.687845791	0.028181773
rbsR	0.688059858	0.016378773
ybbB	0.688784486	0.017017106
sanA	0.69203915	0.018647932
trpL	0.694047562	0.045399624
bcsA	0.696021277	0.034378617
mdtF	0.698184676	0.027443936
hcaF	0.705029131	0.028976392
mraZ	0.710325471	0.016105547
yhjR	0.714139597	0.04512176
tdk	0.71812064	0.031593364
fimE	0.722375476	0.034442764
yjiY	0.723112647	0.038812809
recJ	0.731083992	0.013634429

dctA	0.380568917	1.71828E-13
cueO	0.381149421	1.09197E-08
nikE	0.381240588	1.8192E-10
yidX	0.382612645	1.07977E-06
dnaK	0.383208204	0.01939729
hisH	0.384401272	3.35777E-06
ygiU	0.384847139	0.000531357
argC	0.386828479	4.36425E-09
rfaH	0.388261556	0.000574038
ymjC	0.388403812	5.43494E-05
rfaZ	0.388571585	4.38466E-10
sapB	0.388826913	6.45378E-06
yohM	0.390055533	3.31682E-06
aqpZ	0.391034273	7.06868E-08
mdtE	0.391787697	6.73132E-12
yiaO	0.391922647	7.78201E-10
ylaC	0.393283109	9.46711E-07
yaaH	0.39344148	1.19462E-16
yegT	0.39487804	3.66825E-13
yjaG	0.394944611	1.76992E-10
spr	0.39542592	1.51478E-07
ykgE	0.396326743	1.20412E-08
agaW	0.396560589	1.31746E-09
yffH	0.396579432	1.99072E-09
yjeO	0.396795228	6.72521E-15
eutL	0.397099479	2.62729E-09
livH	0.397437621	2.63392E-06
pspF	0.398588035	2.31371E-09
hofQ	0.398957635	1.71828E-13
ybiY	0.39943664	0.002223461
ybeM	0.400281017	1.94613E-06
yfiP	0.40134368	2.51371E-11
yacC	0.401355995	1.2344E-06
ycgZ	0.401466859	2.62952E-05
yciC	0.401774012	3.1013E-05
ompA	0.402307289	0.010007039
yghO	0.402713316	4.81225E-06
yneG	0.402799632	6.27588E-06
yaiA	0.402835776	8.68067E-08
yiaG	0.402913952	9.00365E-10
yliE	0.403662144	2.21521E-08
gss	0.403800955	1.01739E-08
hyfB	0.404119293	6.37788E-05
dnaQ	0.404537407	0.001872728
mutY	0.404929127	3.91888E-06
ycdS	0.406419704	1.58777E-06

seqA	0.40642334	3.15321E-09
nudC	0.406877901	8.0116E-08
tktB	0.406975651	3.91444E-08
rseB	0.407508282	8.40353E-06
yhhL	0.408255378	3.10553E-07
yqeG	0.410176171	1.76761E-08
avtA	0.410195304	1.45417E-08
galU	0.410361598	0.001987032
nlpB	0.410399482	1.55867E-06
yedD	0.410611813	5.89435E-05
nadC	0.410688519	5.38162E-07
hcr	0.411230717	4.30156E-05
ybhP	0.41236042	7.91695E-08
aroL	0.412987455	2.19534E-10
hcaC	0.413655634	0.028575636
pcnB	0.414205241	3.10839E-10
yahJ	0.415351511	4.5844E-08
yebN	0.415599146	2.12501E-10
maeB	0.415739035	1.2427E-10
rimM	0.416013336	0.027002669
ypfI	0.416752335	2.82169E-07
lit	0.417082228	1.66455E-08
hlpA	0.417315464	1.22033E-11
ygiW	0.418042884	5.59255E-05
cynX	0.418250058	2.11692E-07
gmhB	0.418539752	0.030799753
hupA	0.418735331	0.016955274
ykfI	0.419567075	6.08911E-05
yiaB	0.419868132	3.50061E-10
ycbS	0.420819094	1.41317E-09
ynjH	0.420985969	3.80893E-10
ilvA	0.421839454	3.89294E-08
ydcI	0.422015005	0.000258687
pabC	0.422942485	8.34921E-11
yhhT	0.423766209	1.92677E-05
sufC	0.424196744	2.01646E-07
purR	0.424244017	4.45015E-09
ynjA	0.425466765	3.29737E-05
yjiX	0.425572483	9.29069E-07
rfaG	0.426011536	0.002084342
dacA	0.426087489	0.001449703
rssA	0.426090477	8.45303E-05
gutQ	0.426989252	6.6548E-06
rhtC	0.427287697	2.57254E-08
hofB	0.429211893	5.58543E-09
ybhT	0.429257728	2.88928E-05

uhpA	0.429731813	4.29379E-10
cspC	0.431108133	0.000258687
qor	0.431390586	0.000139453
yjfM	0.431545058	1.44382E-08
yhjA	0.431658571	2.35109E-07
nrdH	0.432379792	9.29663E-09
maa	0.434440143	9.0845E-05
yihS	0.434612237	0.001369826
yrbG	0.435107907	8.67651E-08
yicI	0.435141909	4.64986E-06
yfdY	0.43549695	9.07426E-10
yjjX	0.435778119	9.50253E-08
vacJ	0.435919467	2.27245E-09
cyoC	0.436217579	0.000316919
fabR	0.436487394	0.000345051
yaiZ	0.437225188	4.26487E-05
hofC	0.437752675	1.17111E-11
yidH	0.438421111	2.67792E-11
feaR	0.439165122	2.61966E-09
kptA	0.439302662	0.000100671
yecP	0.43932912	9.5772E-09
bglA	0.4396343	2.09311E-09
rffD	0.439903502	1.36855E-05
xerC	0.44033504	9.46924E-08
mhpR	0.440788515	2.62872E-10
dsdA	0.441545121	8.96148E-06
yfhK	0.442060053	0.000457171
yoeA	0.442191539	5.71357E-08
ycfP	0.442304476	1.4942E-09
hslR	0.44258067	8.00704E-10
fbaB	0.44311253	0.000673645
yfcH	0.443130409	7.19067E-08
pdxK	0.443815588	9.17735E-05
cybB	0.443865108	0.00967923
gmhB	0.44387779	0.007966419
yfdX	0.444155671	1.66188E-05
dksA	0.444218797	0.010349689
yjiZ	0.444332723	7.06408E-06
kdsC	0.444491721	3.39205E-09
dhaR	0.445507697	0.000421008
rnhB	0.445730531	5.24043E-10
ydcQ	0.445773214	0.000315905
yjiH	0.446214652	3.07067E-06
ycjT	0.446413409	0.008786771
rfaI	0.446462593	2.39158E-08
fabF	0.447244775	9.44569E-05

yfeA	0.447314374	2.33253E-07
ydhV	0.447371879	1.90916E-06
ynjF	0.447685204	0.000112447
trmH	0.450049678	0.000331762
uhpC	0.450683779	1.79661E-06
pykA	0.450735067	8.189E-05
mraW	0.450826082	2.47847E-14
yadN	0.450878056	1.16533E-07
ydgA	0.451034042	0.012401192
lldR	0.451438829	0.004196845
puuE	0.451634648	2.42137E-11
cls	0.451650249	1.38703E-07
cpxR	0.452092594	0.000294388
pbl	0.452153162	2.42626E-06
ydcH	0.452951714	0.000170669
paaB	0.452997967	2.56969E-06
hemF	0.454032275	4.87826E-08
rna	0.454136113	3.00821E-08
yadH	0.454506834	8.39015E-05
ygcH	0.456438102	5.96834E-10
dinJ	0.456604841	1.11324E-10
mdtC	0.456988325	7.43883E-05
ygcF	0.457637106	2.27628E-07
pykF	0.458026564	3.79349E-10
phoE	0.458030776	0.002876121
nlpE	0.458452544	0.00026404
yeaA	0.458796538	0.000170757
ycgK	0.458803463	0.000334998
ydhQ	0.459103892	3.82114E-08
rtcR	0.459110407	2.46622E-09
ddlB	0.45920271	9.37721E-09
narW	0.459720246	7.89432E-06
yceB	0.459785912	2.94764E-08
acrR	0.459894408	3.88328E-08
ybgK	0.460487674	1.0779E-05
yifN	0.460818161	5.03543E-07
yphF	0.461174349	3.9792E-06
eutE	0.461225685	0.001096546
glk	0.461491356	0.000438518
ybiR	0.461497791	0.000738499
yegW	0.461582964	1.66777E-07
degP	0.462242919	0.014982217
rnk	0.462339378	1.26842E-06
mobB	0.463262261	7.54543E-06
fadL	0.463734966	5.68439E-06
yahG	0.463739292	1.96787E-05

uup	0.463937563	2.36953E-07
ulaG	0.464530759	1.08437E-10
ycjY	0.464836726	0.00409336
vacJ	0.465646943	7.24171E-05
yfhH	0.466134235	8.6564E-06
hcaB	0.46615893	1.17016E-06
kduD	0.466269063	0.01960928
nagA	0.466321346	1.35564E-05
ybbO	0.466464306	9.93297E-05
ygjR	0.466873446	0.000446676
gltS	0.467313948	3.38981E-05
cysI	0.467539283	0.000164102
hokE	0.468096728	0.007855716
hlpA	0.468541545	5.08235E-09
glmM	0.468582581	0.010451789
emtA	0.468663079	3.81589E-06
mglA	0.468924293	7.08007E-05
yfbL	0.469127333	7.10959E-06
yfiF	0.469709697	1.02662E-07
narJ	0.470161625	6.75425E-05
fucA	0.47072806	0.014500258
puuA	0.47084757	0.000177403
dgoA	0.470931557	0.001552352
ubiH	0.471041994	0.0030711
yfcX	0.47154847	1.5045E-06
phoQ	0.472002641	0.00063197
mdoC	0.472017214	7.08702E-08
ybjT	0.472228562	1.10608E-05
hsdS	0.472621869	2.21733E-06
dppB	0.472782222	5.10705E-09
hcaR	0.472979196	0.003816009
yrfA	0.473457983	4.01667E-06
zitB	0.473676243	2.98382E-08
ypjC	0.473706094	1.66777E-07
ybiM	0.473880526	2.57953E-06
yafC	0.473958785	1.92113E-05
glnB	0.474323484	0.001946355
prlC	0.474609228	0.000194125
dsbC	0.475350125	2.94793E-06
ybbV	0.475434428	1.48062E-07
yliF	0.475623533	0.004547685
recJ	0.47574787	5.92332E-10
yhfA	0.47608887	6.77621E-11
ycgK	0.476893208	0.002605025
ydhU	0.477210721	0.001083978
yjiY	0.477274389	0.000104833

acrE	0.477746905	3.82188E-08
sseB	0.477979391	9.48925E-05
dicB	0.478253324	0.000691691
dgsA	0.478346988	0.000312471
trkA	0.478644705	0.007102861
ppk	0.47870951	0.001799158
elaD	0.478752906	0.004774313
mdtA	0.478899558	7.99792E-05
ycjU	0.479175204	0.005767997
ycjX	0.47938364	5.25016E-05
sstT	0.479591509	6.02776E-06
metN	0.479821393	9.52568E-06
yqfE	0.479909732	5.4514E-05
puuC	0.480231258	0.011021912
hybB	0.480329741	4.84986E-05
qseC	0.480423294	0.00032395
phoR	0.480611076	1.0133E-06
yfjR	0.480615929	1.06803E-05
talA	0.48064937	6.39192E-07
atpF	0.481003555	0.036627815
ygeF	0.481239585	4.28835E-05
yfgC	0.481733878	7.12558E-05
yidF	0.48186935	1.7034E-08
ydiV	0.481901958	0.002658009
livH	0.481972066	2.81073E-06
ymcD	0.482000957	0.000395372
ynfO	0.482350784	2.40989E-08
yiaU	0.482460632	0.002569968
ivy	0.482593616	9.03962E-08
zitB	0.483144827	0.000236709
ilvE	0.483279715	3.41122E-07
ybiJ	0.484429299	0.002874202
yegH	0.484675	4.11958E-05
ybjH	0.48560105	8.41013E-06
ydeN	0.486020054	6.51645E-06
yaiL	0.486030854	0.000270397
ypjA	0.486204366	1.28865E-05
maeB	0.486444489	2.92428E-05
glcE	0.486850614	0.010031269
ybgE	0.487036136	0.000204518
yfcY	0.487581628	8.06194E-09
yfdH	0.487702735	2.64544E-07
rpoS	0.488040588	6.91139E-08
yjiG	0.488143547	1.78936E-07
yabP	0.488202639	2.17646E-10
minD	0.488517884	1.43593E-06

aroL	0.489000417	5.64765E-05
hyi	0.489043543	3.70841E-05
ydiO	0.489111948	0.026617143
hsrA	0.489420656	3.53236E-06
yhdA	0.489467217	8.17334E-07
araG	0.489593254	0.000126926
ygcR	0.49020567	1.99513E-05
yrbB	0.490328715	8.75192E-06
rpmJ	0.490329349	0.000912434
csiR	0.490479433	8.87531E-05
yjgD	0.490574279	4.93814E-06
yjeK	0.490880011	0.004351475
rtcR	0.491227491	2.89399E-06
ynbB	0.491393715	0.046525301
gltI	0.491461359	0.000241876
oppF	0.49173289	9.69024E-06
ogt	0.491871097	3.1714E-06
yaiX	0.491917687	0.00395088
cdaR	0.492028807	1.88945E-08
nirC	0.492542265	3.33613E-06
ygjF	0.49260954	0.000489826
guaD	0.493058587	6.63482E-06
phnC	0.493247061	8.06601E-06
yqiG	0.49332814	0.000113212
ychE	0.494602219	9.97651E-05
hrpA	0.495065291	0.037685526
nusB	0.495116726	0.003281912
emrE	0.495406286	0.02180883
ybgL	0.49542638	1.24324E-05
pdhR	0.496529822	0.00057051
dsbG	0.496561621	0.00432031
yedK	0.496566259	0.002564122
yaiW	0.496652705	7.40704E-07
ydcK	0.496760848	3.32947E-07
hyfC	0.497295998	1.24249E-07
ybiX	0.497981837	5.77783E-07
yfjT	0.498356247	0.03145979
phoQ	0.4986566	0.004816779
setB	0.499113575	0.000898791
ygbN	0.499592796	6.31467E-05
ydaL	0.499845571	8.06461E-07
bioB	0.500145027	0.010835991
ytfT	0.500231996	0.010835991
gldA	0.500338911	5.44298E-07
narQ	0.500357038	1.64436E-06
ccmG	0.500673193	0.001324544

gatC	0.500674362	1.11593E-08
ybcY	0.500749539	0.000785635
eutI	0.500927757	5.98157E-08
yjhA	0.501018491	1.37517E-06
pstS	0.50108973	1.58404E-06
ldcA	0.501212224	7.64897E-07
ltaE	0.501226969	3.80643E-05
cspB	0.50185013	0.002479235
galU	0.501882486	0.049406618
ydgD	0.50226184	0.028148563
smpA	0.502267797	0.042710199
ybhF	0.502329011	1.2335E-05
yhhH	0.502631598	0.001436252
yegT	0.50267756	2.64904E-06
oppC	0.502896083	2.56255E-06
yedZ	0.503352634	0.000955501
nlpD	0.503374196	0.000147805
yiaA	0.503809466	2.35186E-05
thiM	0.503819873	0.003466224
adiY	0.504061386	0.029644819
ykgH	0.504196982	6.68763E-06
yicS	0.5043887	1.79197E-08
sgcQ	0.504443683	2.98518E-10
mrcB	0.504527961	0.001240647
npr	0.504739714	2.19181E-08
hcaD	0.504889423	1.405E-06
yjeM	0.504895172	0.007854624
ybhT	0.505130811	9.07867E-08
ygbA	0.505838216	8.06552E-05
priA	0.50587179	0.012349804
yihI	0.506478931	0.021755364
ldcC	0.506785464	1.42492E-06
cspB	0.507210672	7.50974E-05
yfjH	0.507442975	5.56379E-06
rnhA	0.507919384	0.016146517
pcnB	0.50804479	0.000351093
ydfZ	0.508265721	0.002325873
hisJ	0.508335092	0.001416279
ycdQ	0.508372305	6.56411E-05
dedA	0.509193056	4.10948E-06
ybjX	0.510075631	0.004089194
yidL	0.510488825	4.26934E-09
yedW	0.510700189	0.00108937
galS	0.510825078	1.77903E-06
gdhA	0.510927013	7.25295E-05
ydgH	0.511562986	2.94793E-06

yraM	0.511667378	2.32141E-05
ycfM	0.511809673	0.000469155
ylbH	0.512202325	0.000767213
caiA	0.512563304	2.69048E-06
yhfY	0.512655753	0.009320629
ybjR	0.513106127	6.93824E-06
hyfR	0.513282033	0.002138586
frlC	0.515907384	9.91417E-05
fbaB	0.515986548	9.17214E-08
ypjA	0.516015582	0.000243314
yqgA	0.516286179	0.000175634
yjeJ	0.516381234	9.38015E-07
ygcW	0.516792485	0.00011049
hypE	0.517026927	1.69337E-05
xylF	0.517365616	0.000146644
helD	0.517964661	9.59774E-06
yibG	0.518097407	0.000130975
yifO	0.518183972	6.08489E-08
ydhX	0.518344934	6.13045E-05
fixX	0.518821571	6.93743E-06
yfcZ	0.518869306	0.001132186
pflB	0.519212043	0.004142553
fecI	0.519275856	0.005439929
pmbA	0.519735878	0.000223943
yciO	0.520022589	0.000860778
norW	0.520048103	2.21557E-05
ydjE	0.520051123	0.002045561
erfK	0.520231504	0.016354717
cspA	0.520473785	0.000276381
glxR	0.520570479	0.002338078
nikC	0.520964781	5.24503E-05
dhaL	0.521141348	0.000107353
betT	0.52123454	2.48067E-07
phoP	0.521345597	0.000467572
cspH	0.521638121	0.005651225
lysU	0.521704673	2.91164E-06
kch	0.522068303	1.02968E-06
yegX	0.522185372	0.001738239
yiiQ	0.522619294	0.001939299
ccmF	0.522659145	0.015510145
rbsK	0.523283942	0.003179913
ybeU	0.523294376	0.00873245
topB	0.52367956	9.59738E-05
ykgG	0.523704359	9.9607E-07
norR	0.524042755	0.000347315
trkA	0.524338427	0.002336169

msrA	0.524832874	5.6934E-08
pck	0.524879092	0.02465881
yfcJ	0.524933211	0.026930992
yciQ	0.524945549	0.000241923
tdcB	0.524981364	0.020538129
phnG	0.525201262	3.8643E-05
bglX	0.525217156	5.84958E-07
yehB	0.525248619	0.000653841
ybiM	0.525617883	0.000579664
cpdA	0.525645885	2.91805E-06
ebgA	0.525711895	0.000763156
ygcB	0.52637111	1.60928E-06
cspC	0.526565107	0.036930361
yhiL	0.52673207	0.000209891
poxA	0.527168733	0.004403926
evgS	0.527235996	0.032968363
ydaS	0.527747536	5.00059E-07
ydcH	0.527975348	0.019473579
yrfB	0.528226846	0.000101683
glcC	0.528269632	0.000699409
cchA	0.528512889	1.72805E-07
ybfH	0.528548091	0.000120823
lrp	0.528568915	0.013632768
dgoD	0.528608081	0.008711224
ykgC	0.52937619	4.22481E-08
dipZ	0.529439312	0.000688783
ykfI	0.529591408	2.61417E-06
yqeK	0.529604317	0.000365848
ykiB	0.530098142	4.68431E-06
ybfD	0.530138197	5.01799E-05
mrcB	0.530228104	5.55141E-05
yagL	0.530469774	0.001782992
rsuA	0.530771779	0.0018275
ycgV	0.531129738	2.33258E-06
pdxJ	0.531496944	0.000393727
trpE	0.531625239	2.13557E-06
queA	0.531976525	0.000467572
prpD	0.532269021	0.020477724
ppx	0.532390412	0.002795167
slt	0.532417605	6.33281E-05
mprA	0.532676266	0.000189384
eutC	0.533300521	6.24004E-05
pdxY	0.533416454	0.000437869
puuP	0.53374143	9.14489E-05
xylR	0.53420726	0.009015997
ygaZ	0.53446887	0.00015656

yjjV	0.53470467	8.65451E-06
qseB	0.535675214	0.000109365
yedZ	0.535747184	0.00044799
rpoZ	0.536139657	0.000282256
yggX	0.536221943	7.77437E-06
exo	0.53625595	2.77834E-05
cutC	0.536638703	0.009712234
rnhB	0.53664765	0.000134226
yafP	0.536785078	0.000254931
gidB	0.536850064	0.000210066
ypfE	0.537106345	4.18546E-07
yjbR	0.537317035	3.53946E-05
tdk	0.537850155	4.82744E-05
cysA	0.53794617	5.15983E-05
bcsF	0.538142563	1.68701E-07
trkD	0.538263361	0.001545248
mtr	0.538295265	5.4029E-05
sdaB	0.538804962	6.28889E-05
ygeQ	0.539258472	0.00015594
ndh	0.539684393	5.28576E-05
yfbJ	0.539801443	2.57058E-05
cutA	0.539812848	3.49428E-06
mdaB	0.539920281	5.15983E-05
yceO	0.540207795	5.02937E-05
ydeA	0.540369517	0.00922093
yhhZ	0.54042511	8.22409E-05
yehL	0.540528934	0.001008637
ymjB	0.540974644	0.001101874
yhgG	0.541111698	0.00967923
ybbA	0.541402292	5.30006E-05
lysP	0.541885672	3.029E-05
ydcN	0.542226417	0.002366049
yfjO	0.542286017	0.001424524
yfiR	0.542464459	0.001081618
argF	0.542511866	0.043943605
ascG	0.542938298	0.000898083
arcA	0.542983386	0.044199494
ampD	0.543379492	0.008298009
nlpD	0.543712271	0.007396075
yphB	0.544262533	1.16084E-05
yiiG	0.54429348	0.00015656
yedV	0.544572148	0.000767205
crr	0.54460106	3.37164E-05
hscC	0.544908032	0.011039943
pepN	0.545137603	6.28266E-05
mpl	0.545822672	6.47615E-06

xapB	0.545845722	0.000826519
thiC	0.545897818	0.034599538
nikR	0.546247301	0.006286734
serA	0.546530853	2.29613E-05
yccF	0.546908954	0.016477457
cobB	0.547350512	0.00069186
rimK	0.547716825	0.000474156
yhjE	0.547778221	0.004747378
gltK	0.547858252	0.000780312
rng	0.547997465	0.000395092
kbaZ	0.548302106	0.000440307
yiaT	0.549049866	6.21616E-05
yidG	0.549625638	7.59806E-07
yicE	0.549875558	0.027084867
yraP	0.550081901	0.000190145
mazG	0.550377517	5.12023E-05
thiP	0.550922532	1.79764E-05
ecpD	0.551590451	3.72151E-07
hcaD	0.551839689	1.10692E-06
proQ	0.55200105	0.001282335
ydeI	0.552113673	0.000126147
yrbL	0.552116522	0.00065653
yneJ	0.552550441	4.69507E-05
ykiA	0.553130407	0.000325278
ybhF	0.553559349	0.003253281
ygeH	0.553590319	0.002715573
yjiD	0.553669185	8.92325E-05
yodA	0.553816202	0.000867907
proQ	0.553993848	0.011220559
yhiR	0.554247477	0.000154411
treF	0.55437397	0.004714161
yidI	0.554576472	0.000119342
ihfA	0.55464662	0.007298105
yfiL	0.554917411	7.27529E-06
cyaA	0.555220627	0.000438431
yghT	0.555391021	0.043799059
ymfB	0.555392916	4.28815E-05
bioA	0.5554839	0.011688682
cysW	0.555532384	6.47468E-08
yggF	0.555644127	0.000744366
yhiN	0.555919388	2.39148E-05
ybbC	0.55602407	1.90831E-05
ligB	0.55650771	2.1689E-06
pntA	0.556885168	0.020137198
tbpA	0.557233784	6.13306E-05
yhdU	0.557728346	3.37636E-05

yddL	0.557889587	0.002406644
sspB	0.557920642	2.4979E-07
yfhD	0.557945905	0.017122648
cobT	0.557951771	0.001008417
ypdH	0.558207542	0.002302438
thiF	0.558581643	1.75659E-05
yecT	0.558908142	0.00076835
ybgH	0.559456999	0.00029336
panD	0.560568531	0.002224088
fadD	0.560635358	0.004977255
ybfO	0.560672968	0.015255464
ykfA	0.560798621	0.009644934
yhiJ	0.560865225	0.013543358
ygaM	0.561078968	0.000304792
thrB	0.561238103	7.0659E-06
yjjK	0.561261741	0.000648741
yihN	0.561382985	2.64396E-05
yqaD	0.56146789	1.82447E-05
ybeU	0.561822023	0.012495982
ugpB	0.561988119	0.001552352
dkgB	0.562348775	1.18874E-05
yegP	0.56293851	0.002781232
btuR	0.563310727	0.00013425
ampE	0.563692642	0.000125793
ligT	0.563905059	9.82123E-05
yjbL	0.564029526	0.001279619
garP	0.564306898	0.001909858
yjhR	0.564434562	0.001670841
yhbE	0.565051947	0.000286169
cstA	0.565151536	0.004392424
yhhW	0.565210088	6.33156E-06
gcd	0.565266647	0.000183697
recB	0.565422309	0.02848019
yhjK	0.565533538	9.05722E-06
htgA	0.565652245	3.64937E-06
nrdF	0.565688643	0.001728067
eutG	0.565792603	1.74413E-05
lyxK	0.566086329	0.001121605
bolA	0.566099424	0.006982583
yjhI	0.566640745	0.003373378
eaeH	0.567038489	5.96491E-06
ulaB	0.567555024	0.024636749
ligT	0.567890611	0.002267037
ydgI	0.568068161	0.02070373
yeaE	0.568264354	0.00066412
yaiZ	0.568283496	0.018175052

ptsG	0.568527722	0.004674789
amiA	0.56871727	0.000378269
yeaI	0.568900386	0.004097726
bax	0.57011976	0.003749015
deoA	0.570152002	0.000494148
arsR	0.570796084	1.50542E-05
yfeT	0.571478001	0.000371966
tsr	0.571491361	6.48509E-05
smg	0.57174735	1.82447E-05
ybbB	0.571792987	0.000736564
eptB	0.572071496	1.65063E-05
frwD	0.572279951	0.000120214
yfgH	0.572302625	0.030527521
ybcF	0.572374524	0.018651019
nemA	0.572538434	0.000717064
ygeY	0.572823417	0.010451789
ydjR	0.573025808	0.000870035
gloB	0.573060878	0.000796482
ydeE	0.573295991	0.007593549
yffB	0.573662599	8.05344E-05
idnK	0.574054621	0.000256303
cpxA	0.574058405	0.04581999
fiu	0.574130456	6.07286E-05
ybiA	0.574236921	0.000687662
yidL	0.574334127	5.63602E-06
yjeS	0.57455289	1.38775E-05
melB	0.575176234	0.002682827
trmU	0.57527656	0.013954644
umuC	0.57561759	0.000870615
fimC	0.575692574	0.000707418
sufB	0.575739245	0.048507596
ydhR	0.576052995	0.000114882
rof	0.576428919	1.32333E-06
rfaQ	0.577392601	0.000445163
yejA	0.577449639	0.00021244
gmd	0.577832288	2.58433E-05
rbsR	0.578281141	0.000577655
ccmC	0.579204949	0.00013068
yraM	0.57941191	0.000260767
fumA	0.579541222	0.031005272
ypdA	0.579574567	0.014213131
citG	0.579652747	0.002623203
yggP	0.580037844	0.012401192
prfC	0.580217737	0.000290492
cdh	0.580622803	2.32329E-06
ygfA	0.580754056	0.029221581

dppB	0.580772329	0.000337674
paaC	0.580873108	0.000338277
ycdG	0.580926312	0.000596888
dmsC	0.581285873	0.017376737
yohM	0.581870553	0.000579664
sufC	0.5820256	0.000707716
sapB	0.582472932	0.017378392
btuB	0.582791115	0.009022656
smg	0.582867952	0.000550447
yobA	0.58314915	6.58848E-05
wbbK	0.583256845	0.000137386
nrdG	0.583870145	0.000262601
malQ	0.583938875	0.035131516
frlD	0.583958965	5.95793E-06
elbA	0.583967543	0.001237369
ygbM	0.584289874	0.000380012
ybhS	0.584341119	0.001941139
rbfA	0.5843744	0.02848019
ebgA	0.5845128	0.000412091
yjhX	0.584522626	0.000101092
livF	0.585253491	0.036530481
yehD	0.585746677	0.031592774
yegR	0.585904571	0.001667316
dgoR	0.586168111	6.65434E-05
yicS	0.586238324	3.31875E-06
potB	0.58626737	0.011125717
mdtF	0.586488329	3.04085E-07
yeiL	0.58740323	0.000468874
eutA	0.587454783	4.6942E-06
nikC	0.587459847	0.000264215
yaiT	0.587747755	0.000254823
mltC	0.588024815	0.003074705
ybfD	0.588090655	0.019783281
yicI	0.588139205	3.83089E-05
yehQ	0.58843228	0.024384663
ybgS	0.588767163	0.000246871
kdsC	0.589162278	0.002106049
ybbD	0.589708045	8.44104E-05
yfdM	0.589792103	0.002106049
ybhS	0.590803422	0.000553732
yjfY	0.590900477	0.000246746
aat	0.591570301	9.53818E-05
ycdG	0.591753192	0.045508159
radA	0.591773985	0.001118439
yfjW	0.591810663	0.001308788
speE	0.592326101	0.008767411

ycaP	0.592557732	7.70334E-05
ykgI	0.59271983	0.002207242
csgE	0.592729912	5.99466E-05
talB	0.592835426	0.000161647
nagB	0.592969268	0.030621547
ypdF	0.593065481	0.000286169
bioC	0.59312033	0.000887983
yliJ	0.594085975	0.005799577
envC	0.594151284	0.032598559
yqjK	0.594225223	0.000699117
emrY	0.594475911	0.010229798
yfjN	0.594652787	0.001526205
ygjQ	0.595010991	0.001767305
hycB	0.595146215	0.000763495
ygeP	0.595184458	4.40865E-05
torR	0.59520865	0.000897147
ypdB	0.595232118	0.000824239
ybaD	0.595475669	0.002035508
metA	0.59589141	0.003345919
puuP	0.596093051	0.005379856
hslV	0.596133201	0.000885173
yggL	0.59652718	0.028131552
nirD	0.59681647	0.015790194
ycdS	0.597401423	0.007930283
mhpC	0.597672126	0.005059361
yihO	0.597796133	0.003675786
ypfG	0.5979989	0.000187054
yibF	0.598199891	0.000264215
evgS	0.598414899	0.020314888
yrhA	0.598654313	0.041358872
rluB	0.598727899	0.00953685
ygiL	0.59888807	0.00565558
yrbF	0.598928535	8.49189E-05
ydiT	0.59898621	0.025881588
xthA	0.59904699	0.006115801
recD	0.59939917	4.25755E-05
fadR	0.5995383	0.042685996
dkgB	0.599938964	0.00219066
ybfF	0.600365829	0.000946912
rhaB	0.600598306	0.023404797
priC	0.601214153	9.99709E-05
flxA	0.601485493	0.003916958
narX	0.601558495	0.011793915
kdpB	0.602231792	0.000574038
ydjM	0.602446779	0.000246871
yajB	0.602496358	0.009176681

tsgA	0.602616495	0.001713351
ygcN	0.6028077	0.000313329
trmA	0.603249404	0.000623767
betA	0.603294593	0.007859516
ybeR	0.603431433	0.000772916
yliG	0.60350246	0.037349262
recG	0.603634727	0.000689598
yieM	0.603799169	0.000117612
hypB	0.603985798	0.039232792
hisF	0.604001123	0.001981022
fimE	0.604481118	4.93671E-05
ydjR	0.604576602	0.027206038
ydhR	0.604660253	0.000747938
hybD	0.604721747	0.000193621
ycfX	0.605051309	0.009960643
ampD	0.605653504	0.001712657
entA	0.605680184	8.46809E-05
fumB	0.606339848	0.042744995
yjhP	0.606341553	0.000106139
yjgI	0.606437817	0.029657819
aroP	0.606502834	0.000361922
htgA	0.606668768	0.002080937
yraN	0.607470158	0.007904671
phnK	0.607627484	0.001021736
yecN	0.608036917	0.002218196
ytfJ	0.608371218	0.046575294
yjgN	0.608408138	0.005216337
ygbF	0.608525841	2.9702E-05
zraP	0.608616129	0.00014325
glcD	0.608622341	0.032910812
ndk	0.608687279	0.000813261
yjiK	0.608700268	0.005920381
php	0.609027177	0.008465084
yfaW	0.609428155	0.000169794
ychH	0.609482935	0.007396322
sapD	0.60994134	0.010093068
frlB	0.610041203	0.001848866
djlA	0.610414135	7.30525E-06
ypfH	0.610478577	0.047678593
ychQ	0.6106607	0.000339903
yeaH	0.610792804	0.00012166
dsdA	0.610805474	0.00713554
glnL	0.611355016	3.2532E-05
cysK	0.611474248	0.007962831
yeiG	0.611605625	0.000161973
torZ	0.611720507	0.000126698

nth	0.612042213	0.007015129
fumA	0.612279095	0.035131516
mppA	0.612373535	0.00934239
inaA	0.613011691	0.028148563
yfjZ	0.613089981	0.007282853
yphC	0.61309298	0.000433546
idnD	0.613846409	0.000264215
ykgL	0.614136297	0.032802879
yjhG	0.61444643	0.000424477
dcd	0.61483031	0.008588051
ihfA	0.614856817	0.001282813
yncA	0.614912937	0.002982097
yfeA	0.615049447	0.002885229
uxaA	0.615383956	0.001307263
codA	0.616057039	0.000362553
araE	0.616162526	0.009201979
rumB	0.616452113	0.015281211
speC	0.616767597	0.000857695
yahL	0.617171533	0.007629036
yejE	0.617333218	0.000498559
yrhB	0.617369832	0.003066249
yiaU	0.617562453	0.005595645
yceG	0.617585265	0.034687443
artQ	0.617853523	0.005875249
ebgC	0.618139767	0.003921782
ygbN	0.61829471	0.009326989
hisP	0.61831284	0.000679085
yeaY	0.61859935	0.030357033
yphD	0.618682548	0.000686089
ybgI	0.618820968	0.000934786
yhiP	0.619182001	0.000707689
yrbD	0.619419022	0.015462466
intB	0.619577282	0.000313273
hslV	0.619799657	0.008787929
helD	0.620289149	0.003289933
ygeK	0.620708967	0.013057699
yieN	0.621043153	8.60213E-05
eutP	0.62134754	0.002522883
yeiQ	0.621400285	0.001425657
ymgB	0.622359921	0.015281211
polB	0.622496598	0.000168578
yhdJ	0.622646761	0.005371967
arsR	0.62296202	0.005320212
btuF	0.623056319	0.002841145
focB	0.623159146	0.001692111
serC	0.623238927	0.011924336

hyfF	0.623427805	0.001301984
yacL	0.623564877	0.019795542
yhcN	0.623868483	0.000628404
ytfE	0.623977627	0.025117737
hisH	0.624307383	0.012585021
metN	0.624433054	0.005820908
ilvY	0.624570121	0.000292728
smf	0.624916151	0.00010466
icdC	0.625126119	0.000545887
ybiW	0.625127537	0.001885106
ycaO	0.625422874	0.002619997
ibpA	0.625607556	0.044079254
ycfS	0.625671443	0.000426927
ddlA	0.625766827	0.024173685
yhhF	0.626155687	0.010970025
yihP	0.626542327	0.004807956
csgF	0.626932582	0.010143452
ynfL	0.627426137	0.013729094
pfkB	0.627485824	0.003261645
fucP	0.627657927	0.005568408
ychM	0.627662017	0.006225639
wza	0.627954715	0.002251967
dcuR	0.627984731	0.004342875
citX	0.628054831	0.022848983
glf	0.628236095	0.027953735
fieF	0.628341997	0.019211428
yegV	0.628441496	0.010512626
ydfU	0.628461133	0.016350312
yhdE	0.628537117	0.00167737
dppC	0.628732737	0.000865848
livJ	0.629233461	0.010646714
entE	0.629387253	0.000409773
ilvA	0.62943601	0.001648842
yfdX	0.629943967	0.006192566
yhaC	0.630298996	0.000555411
ampG	0.630790612	0.002473003
yeeJ	0.630851735	0.015565132
cobT	0.631080903	0.004370597
ycgN	0.631392756	0.002302488
uspE	0.631945374	0.009652709
rhaD	0.632017505	0.003306854
abgB	0.632528123	0.002091102
ynhG	0.632798652	0.009939634
yfcQ	0.632833771	0.002674907
yghS	0.632892176	0.002135664
crr	0.633006418	0.003253281

gadW	0.633269609	0.000396679
ygaV	0.633620262	0.014637575
hydN	0.633856688	5.65806E-05
yjhS	0.634551175	0.020067514
prfH	0.634976849	0.000816426
pspF	0.635135188	0.007733602
ybdR	0.636029272	0.00055595
sfmC	0.636221115	0.020238285
ymfE	0.636305053	0.008790399
ybbB	0.636400701	0.000177243
spr	0.636691176	0.047093786
yahD	0.636900775	0.002786375
feoA	0.63729645	0.027585811
nagD	0.637423817	0.000234581
yciG	0.637522588	0.000614569
ihfB	0.637543896	0.003325861
yggM	0.637652494	0.010633062
yieG	0.638264735	0.000435673
aidB	0.638296981	0.007187782
mdtE	0.638305642	0.04436093
yohL	0.638511627	0.001831222
glpD	0.638765263	0.012622599
ycjF	0.638794484	0.001529812
yhiQ	0.639100573	0.008442266
dppA	0.63912175	0.025857351
yeiP	0.639123882	0.023680377
ymgF	0.639129852	0.014743415
sgbE	0.639315079	0.008491381
cspA	0.639380962	0.000578029
deoD	0.639433979	0.026663059
yciE	0.639617685	0.013299084
ppiA	0.639794898	0.000446503
yegS	0.63985665	0.030336029
pstB	0.640029052	0.025653847
btuD	0.640057032	0.000622022
ygdB	0.640112545	0.000243489
yaiP	0.640124843	0.00311669
folM	0.640367313	0.010071049
yhbE	0.640380794	0.000837226
yfdC	0.640860369	0.001848975
yraJ	0.640958733	0.007063243
glvB	0.640991314	0.000446676
yjfF	0.641449976	0.04442194
hycG	0.641450881	0.009671201
cadB	0.641515168	0.012907074
nuoG	0.641909115	0.01497733

mhpA	0.642615254	0.0003741
yrbC	0.642815829	0.001301831
yajI	0.643005477	0.005059361
holE	0.64362426	0.011851797
asnB	0.643735347	0.000742374
cynX	0.644050675	0.005824702
yadL	0.64440804	0.003835159
yfcD	0.644452869	0.000638289
glgC	0.644524193	0.005133631
ygeF	0.64461781	0.002096148
yicO	0.644951184	0.0050175
ampH	0.644984102	0.00458817
ybfE	0.645190162	0.029795948
gspA	0.64554987	0.005410412
yciB	0.645677046	0.036062117
yeeY	0.64579731	0.002569968
yehA	0.646188866	0.046300603
prpR	0.646366833	0.000206537
yigL	0.64639727	0.002972205
rhaR	0.646610151	0.012054884
yhhJ	0.646803227	0.000700092
macA	0.646887063	0.02237016
clpA	0.646918278	0.002938857
tdcG	0.647010631	0.027412182
fabR	0.647316705	0.00340054
glcE	0.647705121	0.017756838
tauD	0.648303369	0.001492858
ygbE	0.64838573	0.002096148
tfaD	0.648413675	0.01213459
yddH	0.648512226	0.022156088
aldB	0.648669714	0.003417367
yheL	0.649037227	0.020438761
xthA	0.64931006	0.00463369
ygcW	0.649702595	0.005743463
ybgJ	0.650151956	0.000808072
ybeM	0.650322495	0.010071049
yjhT	0.65066028	0.012491605
htrC	0.650663285	0.019655472
purN	0.650701924	0.01642579
proA	0.650785473	0.038138745
uidB	0.650905822	0.001959223
ygfI	0.651046082	0.002837006
ygcU	0.651283078	0.006259078
ybfA	0.65156482	0.001468414
yeiN	0.652170532	0.001061666
hypC	0.65245773	0.019679208

soxS	0.652464465	0.006900469
narY	0.652655332	0.026617143
ivy	0.65283383	0.037265875
hycB	0.652977178	0.000118848
ybgJ	0.653035098	0.038653519
sgbU	0.653491523	0.016965238
nfsA	0.653697825	0.020687064
pyrD	0.65381564	0.015474038
smpB	0.653861346	0.009709596
ymgF	0.654130407	0.002786672
poxA	0.65414278	0.037145907
yohH	0.654825668	0.002085588
ansB	0.654988125	0.017527026
ucpA	0.655120022	0.0113274
ygiQ	0.655158871	0.008698907
yfdZ	0.655235721	0.015682195
ybbO	0.655437943	0.008866139
cmtB	0.655548873	0.002399883
ygfS	0.65561314	0.013418166
ygeG	0.65597785	0.024981437
yajR	0.656989437	0.023787688
hisQ	0.657194088	0.015586179
yaiY	0.65764562	0.025250653
fumC	0.657682493	0.022110524
ybjL	0.658170849	0.030872081
yfiA	0.658234885	0.004148016
ycaL	0.658236495	0.002012835
ybcS	0.658293047	0.002629138
yejL	0.658315037	0.003355541
yjjP	0.658539506	0.02304947
hha	0.658759745	0.010084763
yehC	0.659326168	0.001305531
metF	0.659815815	0.002255687
phoR	0.659893946	0.049741679
dedD	0.660089902	0.014016482
uxaC	0.660327893	0.035510249
minD	0.660486334	0.034599538
yafS	0.660563025	0.038788237
fdnI	0.660573407	0.045448378
yciN	0.662303615	0.045161467
allA	0.66263769	0.001479597
yraR	0.662951898	0.003351314
yjeO	0.662993913	0.045147197
yjhH	0.663040928	0.007896929
ydgH	0.663261612	0.004084428
ydfD	0.663788145	0.006380444

yjiG	0.664053116	0.001376568
yjhV	0.66423191	0.016499782
fimA	0.664354632	0.008371025
edd	0.664586092	0.005331244
ycdL	0.664680148	0.008588051
yohN	0.664705743	0.003828881
yhaL	0.664798381	0.031891645
baeS	0.664872685	0.026617143
narH	0.66550523	0.009351289
phoE	0.665820108	0.008787929
yfeY	0.665894612	0.010744709
ybfC	0.666022948	0.003813295
ymjB	0.666350575	0.007160422
kdpA	0.667026977	0.020858118
yccK	0.667324016	0.031903793
ybaA	0.667341774	0.014906127
yfcP	0.667611677	0.007442865
yhcD	0.668093009	0.010916352
eutC	0.668324951	0.029795948
mraZ	0.668803287	0.007363587
ynfD	0.669001028	0.016185028
yciI	0.669230424	0.018994685
entB	0.669635552	0.002913845
hisC	0.669736136	0.04218569
yaaA	0.669911359	0.000308326
fimB	0.670314542	0.01087375
ycaD	0.670668154	0.030714311
yjhB	0.67087393	0.001831222
rfaQ	0.670916841	0.004714161
rbsR	0.671398718	0.001351033
yjgZ	0.671503449	0.04856617
recG	0.671540759	0.00940682
evgA	0.672056808	0.024048195
ycgL	0.672397505	0.003355541
torI	0.673285427	0.003777707
yahB	0.673381601	0.003306854
yciV	0.673398116	0.003574935
yagY	0.673416544	0.005942952
dcd	0.673681077	0.016319329
yahO	0.675140317	0.013859442
recE	0.675172621	0.030150888
ybaL	0.67520272	0.024141294
gor	0.675671746	0.038268225
argG	0.675849099	0.000537183
yoaA	0.675986153	0.030123581
ydfV	0.676192941	0.003896598

yfiC	0.67639192	0.002468389
bioA	0.676443461	0.025367101
yajO	0.676501825	0.010451789
ymcB	0.676539843	0.004498126
ycdL	0.676765207	0.033104992
yqeB	0.6770231	0.023462771
mlrA	0.678119023	0.010451789
ydgI	0.678314964	0.0139423
spy	0.678586102	0.026235589
tauC	0.678730777	0.037626927
ygfY	0.678985934	0.013329132
wzzE	0.679052259	0.015303373
yfiC	0.679169984	0.022398575
yciK	0.679369951	0.003618669
gatY	0.679436636	0.007812064
yjhQ	0.679561666	0.010936903
yhfG	0.680158571	0.010169891
yihG	0.680188804	0.00463369
ybfP	0.680470949	0.020374842
thiG	0.680548703	0.012159943
pabA	0.680747186	0.00426277
ygdR	0.681761631	0.011936568
ybiI	0.681897946	0.010129513
yhaH	0.682132	0.026412824
ygcL	0.682386384	0.004757337
gntX	0.683138172	0.005479266
yjgZ	0.683965953	0.005890958
pfkB	0.683969031	0.017626521
pflB	0.684271982	0.030793006
yidI	0.684592164	0.001063381
yhdX	0.684916152	0.006182239
frlR	0.685025772	0.015487716
kdpA	0.685179234	0.035753017
yhfW	0.685353279	0.00638323
fdnH	0.685949336	0.02064984
argG	0.686518689	0.006417501
ygcH	0.686529287	0.020169534
yegD	0.686734322	0.039644163
ycfR	0.688554786	0.024364848
mtgA	0.688750165	0.011192502
menB	0.688752255	0.0363935
basR	0.689190663	0.015770519
yohF	0.689356708	0.018674287
gltK	0.689498751	0.005034411
yehZ	0.68965747	0.026441521
ybjQ	0.689711654	0.028435537

ddpB	0.689861535	0.024273295
ygaX	0.689921763	0.002777702
gph	0.68994942	0.00524788
marA	0.690445623	0.037706813
ynjC	0.690586415	0.020906332
csdA	0.690870917	0.007637015
ycdB	0.691071388	0.04706169
yfcN	0.691633757	0.000943885
rumB	0.692006048	0.013688913
cusA	0.692301363	0.019089093
ycfL	0.693108987	0.005888288
manZ	0.693215133	0.037729039
uidC	0.6932691	0.026070731
yhdL	0.693608994	0.037826655
ybjJ	0.693769295	0.033480027
entA	0.693784071	0.005430713
yfeG	0.694783478	0.037872811
sgrR	0.694793489	0.001474652
yjgD	0.6948907	0.013065811
fecC	0.695340681	0.017586709
ycbU	0.695657589	0.028070921
ydfV	0.69571424	0.036660954
sgcB	0.695732582	0.013976372
ymcC	0.695851285	0.032622839
ybjE	0.696493363	0.034589454
sgcX	0.696553979	0.025470011
yeiP	0.696559691	0.023008497
yqgC	0.697865013	0.015833833
ycbS	0.698283944	0.021228518
ygiE	0.698301777	0.01471261
yrfC	0.698313022	0.036429756
ykgF	0.698476964	0.007747518
ykgI	0.699637442	0.024364848
yagV	0.700231709	0.010819092
yfdC	0.700484526	0.016173214
trpR	0.700502447	0.048562192
ydiD	0.700591311	0.042063608
bcsZ	0.700642712	0.02071606
tauA	0.700670023	0.041787485
dppC	0.700675773	0.018027793
pepP	0.701453424	0.029214309
yadC	0.702086539	0.016003751
hha	0.702166528	0.012167802
yedM	0.7026527	0.035848777
trpD	0.702927255	0.009457978
yafU	0.703976136	0.022322049

panC	0.704249123	0.029795948
yqcB	0.704256355	0.016456764
dtd	0.705753724	0.011199663
fucO	0.705938188	0.027956687
sgbH	0.706496008	0.010071049
yehU	0.706741707	0.008767411
rbbA	0.707689755	0.014743415
ygcK	0.707845216	0.013047505
yajO	0.708467949	0.033772958
yibH	0.708673755	0.049067389
fpr	0.709288049	0.010970025
yhiK	0.709742104	0.024645726
yghO	0.709931124	0.04632642
galS	0.71005454	0.03398454
yhbX	0.710603755	0.007065737
yecJ	0.710609862	0.030478092
phnD	0.710853548	0.03522679
pbpG	0.711042826	0.023316041
ccmE	0.711471367	0.033660058
surE	0.711549414	0.041290921
argO	0.714643835	0.007836057
pstA	0.714847762	0.048854193
dmsB	0.714995976	0.04428335
ybcJ	0.71582958	0.042801142
iscR	0.716011633	0.011394901
chaA	0.716086162	0.039522895
rplI	0.716474061	0.03187193
ymfA	0.716934118	0.02597643
yehM	0.718518923	0.04633047
ygbF	0.718822509	0.028369199
acrF	0.719268895	0.037636632
yohJ	0.719295478	0.03417915
yccS	0.719740855	0.009867028
ybiI	0.720235037	0.031036463
treF	0.720766437	0.014239422
asnA	0.720803584	0.022253709
ymjA	0.721416082	0.030534999
ybaS	0.722435094	0.040114579
ybiH	0.722516333	0.011936568
smf	0.722663616	0.011570375
malY	0.723607385	0.043680487
aldB	0.723802464	0.033126957
fimZ	0.723850985	0.024973994
uvrB	0.724183677	0.049660243
mfd	0.726419524	0.044764578
ydiZ	0.726889381	0.023094642

exoX	0.727041252	0.022318745
ygfB	0.727140895	0.047259379
torR	0.727571275	0.039298426
csiR	0.728091515	0.049337166
yagZ	0.728325171	0.042621289
psiF	0.728535779	0.031123789
kduI	0.730944319	0.033438579
ygeX	0.730995335	0.01828816
yehD	0.731881226	0.015250424
yjfZ	0.732607436	0.047515274
fecI	0.732858057	0.027260509
nlpA	0.733027573	0.007889877
yfcG	0.734111518	0.038300346
panD	0.734523812	0.018953687
ynjB	0.734835975	0.026404546
hflK	0.735167698	0.02262494
yicN	0.735971581	0.018808148
bglH	0.736414011	0.040894421
yhhL	0.736862545	0.042251195
asnC	0.737095956	0.01678262
ydfE	0.739586295	0.032151134
ygfM	0.74047214	0.047770984
tas	0.74086506	0.037598755
fdhD	0.741786559	0.037205995
artJ	0.741868684	0.028969032
yjiY	0.74208188	0.034104428
mpl	0.744903862	0.037291569
yiaO	0.74564567	0.018354438
yeiM	0.745978952	0.026510989
yhfX	0.74624758	0.020499786
yieM	0.746790874	0.020947211
cytR	0.746883988	0.036644458
leuD	0.747067325	0.026617143
uspA	0.747912098	0.047962984
garR	0.749279055	0.045946196
yiaV	0.751378631	0.026592708
yaeQ	0.751597376	0.028397591
hdeD	0.752125951	0.013408303
yedW	0.75427889	0.040848093
yfeW	0.757074869	0.033156239
dsdX	0.757558276	0.048773171
ompT	0.757854736	0.044645903
rluA	0.757856135	0.021720306
alsC	0.759698072	0.037257274
gph	0.76250272	0.022875999
yieG	0.764242681	0.042817347

miaB	0.76561001	0.047782431
yhdE	0.765836962	0.049273294
yrbD	0.767930594	0.010851273
yohK	0.768168159	0.03261309
yhdY	0.770870828	0.039585614
creC	0.775061947	0.041206656
yiaW	0.775539655	0.021251796
yhdY	0.776226132	0.039111929
yijF	0.776295913	0.040900266
ybbJ	0.788942338	0.047210867