Supplementary Information for

A Cellular Platform for Production of C_4 Monomers

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Materials and Methods

Tables and Figures

Materials and Methods

Commercial materials. Terrific Broth (TB), LB Broth Miller (LB), LB Agar Miller, glycerol, and dimethylsulfoxide (DMSO) were purchased from EMD Biosciences (Darmstadt, Germany). Carbenicillin (Cb), kanamycin (Km), chloramphenicol (Cm), isopropyl-ß-D-thiogalactopyranoside (IPTG), phenylmethanesulfonyl fluoride (PMSF), tris (hydroxymethyl) aminomethane hydrochloride (Tris-HCl), sodium chloride, dithiothreitol (DTT), 4-(2-hydroxyethyl)-1-piperazineethanesulfonic acid (HEPES), and magnesium chloride hexahydrate were purchased from Fisher Scientific (Pittsburgh, PA). Tris-(2-carboxyethyl)phosphine hydrochloride (TCEP) was purchased from Biosynth, Inc. (Itasca, IL). Imidazole was purchased from Acros Organics (Morris Plains, NJ). Sodium hydroxide was purchased from Avantor Performance Materials (Center Valley, PA). Coenzyme A sodium salt hydrate (CoA), acetyl-CoA, butyryl-CoA, acetoacetyl-CoA, β-nicotinamide adenine dinucleotide reduced dipotassium salt (NADH), β-nicotinamide adenine dinucleotide hydrate (NAD^+), formic acid, trichloroacetic acid (TCA), β-mercaptoethanol (BME), lysozyme from chicken egg white, and bovine serum albumin (BSA) were purchased from Sigma-Aldrich (St. Louis, MO). Sodium phosphate dibasic hepthydrate, and N,N,N',N'-tetramethyl-ethane-1,2-diamine (TEMED) were purchased from Sigma-Aldrich (St. Louis, MO). Acrylamide/Bis-acrylamide (30%, 37.5:1), electrophoresis grade sodium dodecyl sulfate (SDS), Bio-Rad protein assay dye reagent concentrate, and ammonium persulfate were purchased from Bio-Rad Laboratories (Hercules, CA). Restriction enzymes, T4 DNA ligase, Phusion DNA polymerase, Q5 DNA polymerase, T5 exonuclease, and Taq DNA ligase were purchased from New England Biolabs (Ipswich, MA). Deoxynucleotides (dNTPs) and Platinum Taq High-Fidelity polymerase (Pt Taq HF) were purchased from Invitrogen (Carlsbad, CA). PageRuler™ Plus prestained protein ladder was purchased from Fermentas (Glen Burnie, Maryland). Oligonucleotides were purchased from Integrated DNA Technologies (Coralville, IA), resuspended at a stock concentration of 100 µM in 10 mM Tris-HCl, pH 8.5, and stored at either 4 °C for immediate use or –20 °C for longer term use. Amicon Ultra 10,000 centrifugal concentrators were purchased from EMD Millipore (Billerica, MA). cOmplete EDTA-free protease inhibitor was purchased from Roche Applied Science (Penzberg, Germany). TEV protease was purchased from the QB3 MacroLab at UC Berkeley. Amicon Ultra spin concentrators and $MultiScreen_{HTS}$ 0.22µm filter plates were purchased from Merck Millipore (Cork, Ireland). D-(+)-glucose was purchased from MP Biochemicals (Santa Ana, CA). 2,4-Pentanediol, 1,3-butanediol, and 4-hydroxy-2-butanone were purchased from Sigma-Aldrich (St. Louis, MO). DNA purification kits, Ni-NTA agarose, genomic DNA isolation, and RNeasy RNA isolation kit were purchased from Qiagen (Valencia, CA). Genome library prep Kapa Biosystem

Hyper Plus Kit was purchased from Kapa Biosystem (Wilmington, MA). Illumina TruSeq RNA Sample Prep Kit was purchased from Illumina (Hayward, CA).

Bacterial strains. *E. coli* DH10B was used for DNA construction and BL21(DE3) Star-T1^R was used for heterologous production of proteins for purification. *E. coli* DH1 (ATCC 39936), DH1Δ5, BW25113Δ5-T1R, DH1Δ5_2406_pcnB(R149L), DH1Δ5_2406_rpoC(M466L), and DH1Δ5_2406_pcnB(R149L)_rpoC(M466L) were used for production and evolution experiments. Genotypes are listed in *Table S1A*.

DH1Δ5 and BW25113Δ5-T1R were constructed with the lamda-red recombinase system [*1*]. The pKD3 template plasmid was used for gene disruption with subsequence recycling of the Cm^R marker using the pCP20 plasmid. The following primers were used.

Name	Sequence	Note
adhE F1	GCTTTGCAAAAATTTGATTTGGATCACGTAATCAGTACCC	Δ*adhE* verification
adhE R1	CATGAGCAGAAAGCGTCAGGCAGTGTTGTATCCAC	Δ*adhE* verification
adhE KF1	TAGTAGCTTAAATGTGATTCAACATCACTGGAGAAAGTCTTGTGTAG GCTGGAGCTGCTTC	Δ*adhE*
adhE KR1	ATCTGAATCAGCTCCCCTGGAATGCAGGGGAGCGGCAAGACATAT GAATATCCTCCTTAG	Δ*adhE*
fabB KO F2	ATTGTGCATTCGAAACTTACTCTATGTGCGACTTACAGAGGTATTGA ATGGTGTAGGCTGGAGCTGCTTC	Δ*fabB*
fabB KO R2	GTAACGTCGGATGCGACGCTGGCGCGTCTACTCCGACCTACTGCG AATTACATATGAATATCCTCCTTAG	Δ*fabB*
frdBC KF1	ATGGCTGAGATGAAAAACCTGAAAATTGAGGTGGTGCGCTATAACG TGTAGGCTGGAGCTGCTTC	Δ*frdBC* [*2*]
frdBC KR1	TTACCAGTACAGGGCAACAAACAGGATTACGATGGTGGCAACCACC ATATGAATATCCTCCTTAG	Δ*frdBC* [*2*]
poxB KF1	CAGATGAACTAAACTTGTTACCGTTATCACATTCAGGAGATGGAGAA CCGTGTAGGCTGGAGCTGCTTC	Δ*poxB* from promoter
poxB KR1	CATGGCATGTCCTTATTATGACGGGAAATGCCACCCTTTATTCCGG GGATCCGTCGACC	Δ*poxB* from promoter
poxB F1	AGTGGTTTCCGGTGAATATACGGTGAGCAGCAC	Δ*poxB* verification
poxB R1	GTTCGCAGTGACTGAGCAGAGCGACCAGGT	Δ*poxB* verification
poxB KF2	AAACAAACGGTTGCAGCTTATATCGCCAAAACACTCGAATGTGTAG GCTGGAGCTGCTTC	Δ*poxB*
poxB KR2	CCTTAGCCAGTTTGTTTTCGCCAGTTCGATCACTTCATCACATATGA ATATCCTCCTTAG	Δ*poxB*

ackA KF1	GGCTCCCTGACGTTTTTTTAGCCACGTATCAATTATAGGTACTTCCG TGTAGGCTGGAGCTGCTTC	Δ*ackA-pta* from promoter
pta KR1	CCGCAGCGCAAAGCTGCGGATGATGACGAGAATTCCGGGGATCCG TCGACC	Δ*ackA-pta* from promoter
ackA F1	ATACCCACTATCAGGTATCCTTTAGCAGCCTGAAGGCC	Δ*ackA-pta* verification
pta R1	TCACCAACGTATCGGGCATTGCCCATCTTC	Δ*ackA-pta* verification
ackA KF2	ATGTCGAGTAAGTTAGTACTGGTTCTGAACTGCGGTAGTTCTTCAGT GTAGGCTGGAGCTGCTTC	Δ*ackA* [*3*]
ackA KR2	TCAGGCAGTCAGGCGGCTCGCGTCTTGCGCGATAACCAGTTCTTC CATATGAATATCCTCCTTAG	Δ*ackA* [*3*]
pta KR2	TGTGCAGACTGAATCGCAGTCAGCGCGATGGTGTAGACGACATATG AATATCCTCCTTAG	Δ*ackA-pta* from promoter
ackA F2	TTCAAAACATTTTGTCTTCCATACCCACTATCAGGTATCCTTTAGCA GCCTGAAGGCCT	Δ*ackA-pta* verification
pta R2	TTGTTGGTTTGGATTCAGTGATTGCGGACATAGCGCAAATATTCCCT TGCACAAAACAA	Δ*ackA-pta* verification

Gene and plasmid construction. Plasmid construction was carried out using standard molecular biology techniques using the Gibson protocol [*4*] and Golden Gate Assembly [*5*]. PCR amplifications were carried out with Q5 DNA polymerase or Phusion DNA polymerase, following manufacturer instructions. Primer sequences are listed in *Table S1B*. Constructs were verified by sequencing (Quintara Biosciences; Berkeley, CA). Synthetic genes were assembled using gBlock sequences (*Table S1D*). gBlocks were resuspended at 10 ng/μL in 10 mM Tris-HCl, pH 8.5 and used directly for assembly of vectors.

Constructs for AdhE2 biochemical characterization

pCWori-strep.adhe2. The synthetic gene for AdhE2 was amplified from pCWori-ter.adhE2 using the adhE2 F6 and adhE2 R1 and inserted into the NdeI-HindIII of pCWOri.

pCWori-strep.adhe2(C244A). The synthetic gene for AdhE2 was amplified by SOE-PCR with primers adhE2 F6/adhE2 R9 (5'-end), adhE2 F9/adhE2 R1 (3'-end) and inserted into the NdeI-HindIII site of pCWori.

pCWori-strep.adhe2(H721A/H735A). The pCWori-strep.adhE2(H735A) cloning intermediate was made by SOE-PCR with adhE2 F6/adhE2 R9 (5'-end), adhE2 F9/adhE2 R1 (3'-end) and inserted into the NdeI-HindIII sites of pCWori. pCWori-strep.adhE2(H735A, H721A) was made by SOE-PCR amplified from pCWOri-strep.adhE2(H735A) with adhE2 F6/adhE2 R11 (5'-end), adhE2 F11/adhE2 R1 (3'-end) and inserted into the NdeI-HindIII sites of pCWori.

pCWori-strep.aldh The sequence coding residues M1-N448 of the synthetic *adhE2* gene were amplified using primers adhE2 F6 and adhE2 AADH R1 from pCWori-ter.adhE2 and inserted into the NdeI-HindII site of pCWori.

Constructs for the front end of the pathway

pBT33-Bu1. Contains the phaA.phaB operon driven by the P_{BAD} promoter and the *crt* gene driven by the P_{Trc} promoter in the pBAD33 backbone [*6*].

pT5T33-phaA.phaB-crt. Contains the phaA.phaB operon driven by the P_{T5} promoter and the *crt* gene driven by the P_{Trc} promoter in the pBAD33 backbone [*6*].

pT533-phaA.phaB. The oligos trc.crt delete GO1 and trc.crt delete GO2 were inserted into the XbaI restriction site of pT5T33-phaA.phaB-crt to remove the *crt* gene and generate pT533-phaA.phaB.

pT533-phaA. The *phaA* gene was amplified from pT533-phaA.phaB using primers phaA GF1 and phaA GR1 and inserted into pT533-phaA.phaB cut with NdeI and XbaI using Gibson assembly.

pBT33-Bu2. Contains the *phaA.hbd* operon driven by the P_{BAD} promoter and the *crt* gene driven by the P_{Trc} promoter in the pBAD33 backbone [*6*]

pT5T33-phaA.hbd-crt. Contains the *phaA.hbd* operon driven by the P_{T5} promoter and the *crt* gene driven by the P_{Trc} promoter in the pBAD33 backbone [*6*]

pTT33-phaA.hbd-crt. Contains the *phaA.hbd* operon driven by the P_{Trc} promoter and the *crt* gene driven by the P_{Trc} promoter in the pBAD33 backbone [*6*].

pT533-phaA.hbd. The oligos trc.crt delete GO1 and trc.crt delete GO2 were inserted into the XbaI restriction site of pT5T33-phaA.HBD-crt to remove the *crt* gene and generate pT533-phaA.HBD.

pBT-0.03HBD. This plasmid was made with the parent plasmid pBT33-Bu2 with the 30K RBS (CGACTACGGGTAATTCGGAACGACAGTCGCCCCAAA) in front of the *hbd* gene.

pBT-0.3crt. This plasmid was made with the parent plasmid pBT33-Bu2 with the 300K RBS (GAGTCGAGAGGCTGCACACAAGACAGACCGAGTC) in front of the *crt* gene.

PDHc overexpression

pBBR1-aceEF.lpd. Contains the *aceEF-lpd* operon driven by the P_{Lac} promoter [*6*].

AdhE2 screening

pCDF3-ter.adhE2. The pCDF3 cloning intermediate was constructed by QuickChange mutagenesis of pCDFDuet to modify the origin using CloDF13-cop3 QCF1/QCR1 primers. The Sp resistance marker and CloDF13cop3 origin were amplified using aadA CloDF F1/R1

primers and inserted into the Bsu36I and HindIII cut sites of pCWori-ter.adhE2 to replace the origin and resistance markers of pCWori.

pCDF3-ter.adhE2.1-96. AdhE2 variant containing plasmids (*Table S1.D1*) were constructed by Calysta Inc. (Menlo Park) using pCDF3-ter.adhE2 as the parent plasmid.

pCDF3-ter.adhE29-45. AdhE2 homologs containing plasmids (*Table S1.D2*) were constructed by Calysta Inc. (Menlo Park) using pCDF3-ter.adhE2 as the parent plasmid.

ALDH screening

pCDF3-ter.aldh1-15,46. Monofunctional ALDH containing plasmids were constructed by Calysta Inc. (Menlo Park) using pCDF3-ter.adhE2 as the parent plasmid. The *aldhX* gene (*Table S1.D3*) was inserted upstream of the ADH domain of AdhE2, separated by a stop codon, leaving some residual expression of the ADH domain.

pCDF3-aldh1-15,46. (*Table S1.B1*) The oligos ter delete GO5 and ter delete GO6 were inserted into the BamHI-EcoRI restriction sites of pCDF3-ter.aldh1-15,46 to remove the *ter* gene and generate pCDF3-aldh1-15,46.

pCWori-ter.adhE2. Contians the *ter.adhE2* operon driven by a double P_{Tac}. It also contains the *lacIq* gene [*6*].

pCWori-ter-aldh46.adh. The *aldh46* gene was amplified from pCDF3-ter.aldh46 using the aldh46 GF3 and aldh46.ADH GR1 primers. The ADH domain of adhE2 was amplified from pCWori-ter.adhE2 using primers aldh46.ADH GF1 and ADH GR1. The two amplicons were inserted into the EcoRI and HindIII cut pCWori-ter.adhE2 using Gibson assembly.

pCWori.trc-ter-adhE2. The *rrnb* terminator and P_{trc} promoter from pBT33-Bu2 was amplified with primers pCWoriTrc F1/R1 and inserted between the *ter* and *adhE2* genes at the EcoRI site of pCWori-ter.adhE2 using Gibson assembly.

pCWori.trc-ter-aldh46.adh. The *aldh46* gene was amplified from pCDF3-ter.aldh46 using primers aldh GF1 and aldh46.ADH GR1 primers. The sequence encoding the ADH domain of AdhE2 was amplified from pCWori-ter.adhE2 using primers aldh46.ADH GF1 and ADH GR1. The two amplicons were inserted into EcoRI and HindII digested pCWori.trc-ter-adhE2 using Gibson assembly.

ADH screening:

pCWori.trc-ter-aldh46.adhX. The cloning intermediate pCWOri.trc-ter-aldh46 was constructed by Gibson assembly with the aldh46.x G1 gBlock and HindIII digested pCWori.trc-ter-

aldh46.adh. gBlocks containing *adh/dhaT* genes (*Table S1.E1)* were inserted into SpeI/XbaI digested pCWori.trc-ter-aldh46 using Gibson assembly.

ALDH.ADH screening

ALDH.ADH (X.Y) combinations 3.12, 6.8, 7.2, 7.8, 7.12, 9.8, 9.12. These plasmids were made by Gibson assembly using the pCWori.trc-ter-aldh46.adhY plasmid digested with EcoRI and XbaI to remove the *aldh46* gene and generate the backbone. Inserts were obtained by PCR amplification using primers aldhX GF2 and aldhX.adhY GR1 from pCDF3-aldhX. For the plasmid containing *aldh7.adh2*, the extra oligos aldh7.adh2 GO1 and aldh7.adh2 GO2 were also included to reinsert the 5' end of *adh*2 removed by EcoRI digestion.

ALDH.ADH (X.Y) combinations 3.2, 3.8, 6.2, 6.12, 9.2, 14.2, 14.12, 14.8. These plasmids were constructed by Golden Gate assembly. *aldhX* was amplified with primers aldhX GGF1 and aldhX.(adhY) GGR1 from pCDF3-aldhX. *adhY* was amplified with (aldhX).adhY GGF1 and adhY GGR1 from pCWori.trc-ter-aldh46.adhY and inserted into pCWori.trc-ter-RFP digested with BsaI.

ALDH.ADH combinations 3.15, 3.17, 3.18, 3.19, 3.21, 3.22, 7.15, 7.18, 7.19, 7.20, 7.21, 7.22, 46.19, 46.20, 46.21. The appropriate *aldh* gene was amplified with primers aldh3 GGF1 or aldh round 1 library GGF1 and aldh3/7/46.(adh) GGR1 from pCDF3-aldh3/7/46 (see *Table S1.B3*). The adh gene was amplified with adh15-22 GGF1 and adh15-22 GGR1 from the appropriate gBlock (*Table S1.E1)*. The *aldh* and *adh* genes were inserted into pCWori.trc-ter-RFP digested with BsaI via Golden Gate assembly.

pCWori.trc-ter-RFP. Prior to inserting the BsaI-RFP-BsaI Golden Gate cassette, two BsaI cut sites on the backbone of pCWori.trc-ter-aldh46.adh2 were removed. The first BsaI cut site in the *rrnB* terminator was removed by amplifying the regions of the *rrnB* terminator flanking the cut site with primers rrnB-1 GF1/GR1 and rnnB-2 GF1/GR1 and inserting into pCWori.trc-ter-aldh46.adh2 digested with XhoI and SfiI using Gibson assembly. The second BsaI site was removed by inserting oligos BsaI delete GO1 and BsaI delete GO2 into the BsaI cut site using Gibson assembly. The gene for RFP was amplified from pET28a(gg)-RFP with RFP BsaI GF2 and RFP BsaI GR2 and inserted into the BsaI removed pCWori.trc-ter-aldh46.adh2 cut with EcoRI and SpeI using Gibson assembly.

sADH screening

pCWori.trc-sadhX-aldh7.adh2. The *sadhX* gene was amplified from the corresponding gBlock (*Table S1.E2*) using primers sadhX GF1 and sadhX GR1 and inserted into pCWori.trc-ter-aldh7.adh2 cut with NdeI and XhoI.

Constructs for chromosomal mutations. The pCRISPR-Gibson1 plasmids were constructed to clone constructs with specific guide sequence to target the *E. coli* chromosome for introduction of point mutants. The parent plasmid, pCRISPR-Gibson1 (#2786), was generated from pCRISPR (Addgene 42875) to introduce cut sites between sgRNA promoter and the sgRNA to facilitate the use of Gibson assembly to introduce guide sequences for the target DNA. All guide sequences were generated using the Benchling CRISPR tool (see *Table S1.C* for guide sequences).

pCRISPR-PcnB2409 (#2784) was constructed by insertion of the annealed oligonucleotides, P1155 and P1156, and inserted into the XbaI-HindIII site of pCRISPR-Gibson1 using the Gibson protocol.

pCRISPR-RpoC2406 (#2794) was constructed by insertion of the annealed oligonucleotides, P1232 and P1233, and inserted into the XbaI-HindIII site of pCRISPR-Gibson1 using the Gibson protocol.

Expression and purification of AdhE2 constructs. TB (1 L) containing carbenicillin (50 μg/mL) in a 2.8 L Fernbach baffled shake flask was inoculated to OD_{600} = 0.05 with an overnight TB culture of freshly transformed *E. coli* containing the appropriate overexpression plasmid. The cultures were grown at 37 °C at 200 rpm to OD_{600} = 0.6 to 0.8 at which point cultures were cooled on ice for 20 min, followed by induction of protein expression with 1 mM IPTG and overnight growth at 16 °C. Cell pellets were harvested by centrifugation at 9,800 × g for 7 min and resuspended at 20 mL/L of culture with Buffer W (100 mM Tris-HCl, 150 mM sodium chloride, 1 mM EDTA, pH 8.0) supplemented with 2 mg/mL lysozyme and 2 μL/50 mL final volume Benzonase and frozen at –80 °C.

Frozen cell suspensions were thawed and frozen twice before finally thawing and adding 0.5 mM PMSF as a 50 mM stock solution in ethanol dropwise. The cell suspension was lysed with a Misonix 3000 probe sonicator at full power with a 15 second on, 60 second off cycle for a total sonication time of 2.5 min on ice. The lysate was centrifuged at 15,300 × g for 20 min at 4 °C to separate the soluble and insoluble fractions. DNA was precipitated in the soluble fraction by addition of 0.5% polyethylenimine as a 15% *v*/*v* stock solution added dropwise. The precipitated DNA was removed by centrifugation at 15,300 × g for 20 min at 4 °C. The lysate was loaded onto a Strep-tactin Superflow High Capacity column (IBA, 1 mL resin/L expression culture) by gravity flow. The column was washed with 20 column volumes Buffer W. The protein was then eluted with 2.5 mM desthiobiotin in Buffer W. Fractions containing ALDH protein by A280 were pooled and concentrated in an Amicon Ultra 10,000 MWCO concentrator. Concentrated protein was supplemented with glycerol to 10% *v*/*v* and stored at –80 °C.

AdhE2 biochemical assays. AdhE2 activity was measured using three different assays as described below.

NADH oxidation assay. Reactions were measured by monitoring the oxidation of NADH at 340 nm at 25 °C. The assay mixture (400 µL in a 1 cm cuvette) contained 100 µM NADH in 100 mM Tris, 1 mM DTT, pH 7.5. The reaction was initiated by the addition of substrate. Addition of either butyryl-CoA or acetyl-CoA monitored the additive reduction of the acyl-CoA substrate in the ALDH active and the aldehyde intermediate in the ADH active site. Addition of either butyraldehyde or acetaldehyde monitors solely the activity of the ADH domain.

CPM free CoA release assay. The activity of the ALDH domain was monitored by release of free CoA using the 7-diethylamino-3-(4'-maleimidylphenyl)-4-methylcoumarin (CPM) fluorescence-based thiol quantification assay [*7*] with butyryl-CoA or acetyl-CoA as a substrate. Assay conditions were the same as above except a final assay volume of 200 µL was used and the reaction was initiated by substrate addition. The reaction of CPM with released free CoA was monitored by fluorescence with excitation at 405 nm and emission at 530 nm. k_{cat} and K_M were determined by fitting to initial rate data with Origin (OriginLab, Northampton, MA) using the equation:

$$v_0 = \frac{k_{cat}[S]}{K_M + [S]}$$

where v_o is the initial rate and [*S*] is the substrate concentration.

ALDH domain phylogenetic analysis. A literature search for ALDH domains of characterized substrate specificity was performed since our biochemical characterization suggested that this domain controls the overall selectivity of acyl-CoA reduction. The set of identified homologs consisted of three C_2-specific bifunctional AdhE2 homologs, four C_4-specific monofunctional ALDHs, and one atypical C_2-specific ALDH (*Figure S5A*). The sequences were all of bacterial origin except for an AdhE2 homolog identified from the protozoan parasite *Giardia intestinalis*. These sequences were then placed in a phylogenetic tree such that the branching pattern was biased by their characterized substrate preference. Next, the entire ALDH gene family was assembled into a second phylogenetic tree with the branching pattern again biased by the characterized substrate specificity from the first tree. The full family tree comprised of more than 1,200 sequences, of which approximately 33% were derived from bifunctional ALDH domains.

Production of C_4 compounds in shake flasks. Overnight cultures of freshly transformed *E. coli* strains were grown for 12–16 h in TB at 37 °C and used to inoculate TB (50 ml) with glucose replacing the standard glycerol supplement (1.5% (*w*/*v*) glucose for aerobic cultures and 2.5% (w/v) glucose for anaerobic cultures) and appropriate antibiotics to an optical density at 600 nm OD_{600} of 0.05 in a 250 mL-baffled flask (Kimble Glass; Chicago, IL) or a 250 mL-baffled anaerobic flask with GL45 threaded top (Chemglass). The cultures were grown at 37 °C in a rotary shaker (200 rpm) and induced with IPTG (1.0 mM) at OD_{600} = 0.35–0.45. The growth temperature was then reduced to 30 °C, and the culture flasks were sealed with Parafilm M (Pechiney Plastic Packaging) to prevent product evaporation for aerobic cultures. Anaerobic cultures were sealed and the headspace was sparged with argon for 3 min immediately follow induction. Aerobic cultures were unsealed for 10 to 30 min every 24 h then resealed with Parafilm M, and additional glucose (1% (*w*/*v*)) was added 1 day post-induction. Samples were quantified after 3 d of cell culture, unless otherwise noted. For cultures grown with an oleyl alcohol layer, cultures (40 mL) were grown at 37 °C for 3 h before induction with IPTG (1 mM). Oleyl alcohol (10 mL) was then added. Cultures were sealed and the headspace was sparged with argon for 3 min. At this time, the growth temperature was reduced to 30 °C. Cultures were grown for 5 d before harvesting. Both the aqueous and organic layers were reserved for quantification.

Quantification of *n*-butanol titers. Samples (2 mL) were removed from cell culture and cleared of biomass by centrifugation at 20,817 × *g* for 2 min using an Eppendorf 5417R centrifuge. The supernatant or cleared medium sample was then mixed in a 9:1 ratio with an aqueous solution containing the hexanol internal standard (10 g L^{-1}). These samples were then analyzed on a Trace GC Ultra (Thermo Scientific) using an HP-5MS column (0.25 mm × 30 m, 0.25 μM film thickness, J & W Scientific). The oven program was as follows: 75 °C for 3 min, ramp to 300 °C at 45 °C min^{-1}, 300 °C for 1 min. Alcohols were quantified by flame ionization detection (FID) (flow: 350 mL min^{-1} air, 35 mL min^{-1} H_2 and 30 mL min^{-1} helium). Samples containing *n*-butanol levels below 500 mg L^{-1} were requantified after extraction of the cleared medium sample or standard (500 μL) with toluene (500 μL) containing the isobutanol internal standard (100 mg L^{-1}) using a Digital Vortex Mixer (Fisher) for 5 min set at 2,000. The organic layer was then quantified using the same GC parameters with a DSQII single-quadrupole mass spectrometer (Thermo Scientific) using single-ion monitoring (*m/z* 41 and 56) concurrent with full scan mode (*m/z* 35–80). Samples were quantified relative to a standard curve of 2, 4, 8, 16, 31, 63, 125, 250, 500 mg L^{-1} *n*-butanol for MS detection or 125, 250, 500, 1,000, 2,000, 4,000, 8,000 mg L^{-1} *n*-butanol/ethanol for FID detection. Standard curves were prepared freshly during each run and normalized for injection volume using the internal isobutanol standard (100 or

1,000 mg L^{-1} for MS and FID, respectively). Standard curve was normalized for injection volume using the internal standard.

Quantification of 1,3-butanediol (BDO) and 4-hydroxy-2-butanone (HB) titers. Samples (2 mL) were removed from cell culture and cleared of biomass by centrifugation at 20,817 × *g* for 2 min using an Eppendorf 5417R centrifuge. The cleared medium samples, or standards prepared in TB medium, diluted 1:1000 into water, and filtered through a 0.22 μm filter (EMD Millipore MSGVN2210). Supernatants were diluted 1- to 1,000-fold with water containing 2,4-pentanediol (10 μM) added as internal standard and analyzed on an Agilent 1290 HPLC using a Rezex ROA-Organic Acid H^+ (8%) column (150 × 4.6 mm, Phenomenex) with isocratic elution (0.5% *v/v* formic acid, 0.6 mL min^{-1}, 55 °C). Samples were detected with an Agilent 6460C triple quadrupole MS with Jet Stream ESI source, operating in positive MRM mode (*m/z* 91→73 transition; fragmentor, 50 V; collision energy, 0 V; cell accelerator voltage, 7 V; delta EMV, +400). Samples were quantified relative to a standard curve of 0.3125, 0.625, 1.25, 2.5, 5, 10 g L^{-1} 1,3-butanediol and 4-hydroxy-2-butanone.

Anaerobic growth competition and enrichment validation. DH1Δ*5* transformed with *n*-butanol production plasmids capable of a range of titers were mixed at various ratios and cultured anaerobically as described above. Flasks were sampled with a syringe to collect culture media supernatants for quantification of metabolites and to measure growth. Pelleted cells were used as template for qPCR of *n*-butanol plasmids to determine the relative abundance of different subpopulations and compared to a standard curve of purified plasmids. The qPCR reactions were performed using Bio-Rad Sybr-Green mastermix according to the manufacturer protocol, and OD-normalized boiled cell pellet was used as template.

Adaptive evolution. Host strains were transformed with appropriate synthetic pathways and plated on LB agar plate with appropriate antibiotics over night at 37 °C. Colonies were picked and grown in 5 ml TB media with 2.5% (*w/v*) glucose replaced with the standard glycerol carbon source overnight at 37 °C at 200 rpm. Overnight cultures were then inoculated to fresh 30 mL TB media with 2.5% glucose with initial OD_{600} of 0.05 and grown at 37 °C at 200 rpm. Once cultures reached OD_{600} ~0.3–0.4, cultures were induced with 1 mM IPTG and sparged with argon for 3 min. Growth temperature was then lowered to 30 °C. Cultures were then serially transferred to fresh media every 24–72 h to an initial OD_{600} of 0.05 to approximate continuous growth with limited time spent in stationary phase. The growth time of 2472 h was chosen such that the cultures would be in late-log or early-stationary phase. Growth media was TB with 2.5% glucose, 1 mM IPTG, and appropriate antibiotics. Culture OD_{600} was monitored daily and

cultures were transferred when the majority of cultures were in late log-phase growth, usually OD_{600} 1.5–2.0. Culture supernatant samples (2 mL) were collected for metabolite quantification. All cultures were transferred simultaneously, the headspace was sparged with argon for 3 min, and growth was continued at 30 °C in a rotary shaker (200 rpm). Selections were continued (from three weeks or three months) until no improved strains were isolated from the culture. Final cultures were stored as 15% glycerol stocks at –80 °C in addition to being streaked on LB agar plates. Individual colonies were picked and cultured for metabolite production in TB to confirm butanediol, hydroxybutanone, and butanol production relative to wild type strains.

Genome sequencing. Cells were grown on 10 mL LB media with 2.5% (*w/v*) glucose with appropriate antibiotics overnight at 37 °C. Cell were then spun down at 8000 × *g* in a Beckman centrifuge. Cell pellets were then processed using the Qiagen Genomic DNA Isolation Kit according to manufacturer specifications. Genomic libraries were then prepared for sequencing using the Kapa Biosystem Hyper Plus Kit with no modifications to the standard protocol. For each library, 1 µg of genomic DNA was used with 3 µl of adapter (40 µM) per ligation. A double-sided selection to obtain 600 bp fragments was then performed using 0.55 vol of right and 0.6 vol of left Ampure XP beads (Beckman Coulter). No PCR amplification was carried out after the size selection. Libraries were sequenced at the UC Davis DNA Core Facility with PE300 sequencing using an Illumina MiSeq. Sequencing results were mapped against the the *E. coli* genome (DH1- Accession ID: NC_017625, BW25113 - Accession ID: NZ_CP009273) and compared against reads obtained from our DH1Δ*5* or BW25113Δ*5* parent strain using Breseq v. 0.25d [*8*].

Cell lysate enzyme assays. Biomass was harvested at the end of production and stored at –80 °C. Frozen cell pellets (from 2 mL culture) were thawed and resuspended in 500 µL of 100 mM Tris-HCl pH 7.5 containing DTT (5 mM) and PMSF (0.5 mM).

PhaA. Thiolysis activity was measured by monitoring the enolate form of acetoacetyl CoA as previously described [*9*]. Assays were performed at 30 °C in a 96 well plate in a total volume of 100 µL containing 100 mM Tris-HCl, pH 7.5, 10 mM $MgCl_2$, 1 mM DTT, 10 µM CoA, and 20 µM acetoacetyl CoA.

Hbd, Ter, Aldh, and Adh activities were assayed as described [*6*]. Briefly, all assays were perfomed at 30 °C in a 96 well plate in a total volume of 100 µL. The mixture for the Hbd assays contained 100 mM Tris-HCl, pH 7.5, 100 µM acetoacetyl CoA, 100 µM NADH. The Hbd activity was monitored by the oxidation of NADH at 340 nm. The mixture for the Ter

assays contained 100 mM Tris-HCl, pH 7.5, 100 μM NADH, and 50 μM crotonyl CoA. The Ter activity was monitored by the oxidation of NADH at 340 nm. The mixture to assay the aldehyde domain of AdhE2 assays contained 100 mM Tris-HCl, pH 7.5, 0.5 mM DTT, 400 μM NAD^+, 400 μM CoA, and 10 mM butyraldehyde. The acitivity of the aldehyde domain was monitored by the reduction of NAD^+ at 340 nm. The mixture to assay the alcohol domain of AdhE2 contained 100 mM Tris-HCl, pH 7.5, 0.5 mM DTT, 400 μM NADH, and 10 mM butyraldehyde. The activity of the alcohol domain was monitored by the oxidation of NADH at 340 nm.

RNA sequencing and analysis. Cells with synthetic pathways were harvested after 24 h post induction with IPTG for RNA isolation. RNA was isolated using the RNeasy RNA isolation kit (Qiagen). In house rRNA removal method was used to remove rRNA before sequencing. 5 μg of total RNA was treated with 4.5 μL of TURBO DNase (ThermoFischer) in a 50 μL reaction including 5 μL of 10× buffer to remove genomic DNA. The reaction was incubated at 37 °C for 30 min. The reaction was diluted with 100 μL of Bufffer RLT and 200 μL of 70% ethanol and transferred to an RNeasy column (Qiagen) for RNA cleanup following the manufacture instructions. 1 μg of DNase treated RNA was combined with 1 μL of 0.5 μM DNA probes (see *Table S1E*) with Hybridization buffer (200 mM NaCl, 100 mM Tris-HCl pH 7.5) up to 20 μL. Hybridization of oligos occurred by holding at 95 °C for 2 min, followed by a gradient to 45 °C at –0.1 °C/s. 5U of RNase H (Epicentre) in 2.5 μL of 10× Digestion buffer (0.5 M Tris-HCl pH 7.5, 1 M NaCl, 200 mM $MgCl_2$) were added, and the resulting mixture was incubated at 45 °C for 30 min. Following cleanup with the Qiagen RNeasy Kit, the sample was treated with 3 U of TURBO DNase. Finally, the Qiagen RNeasy Kit was used to clean up samples one last time before RNA-Seq library prep. RNA-Seq libraries were prepared using the Illumina TruSeq RNA Sample Prep Kit. Samples were sequenced with Illumina HiSeq4000 at UC Davis DNA core. Reads were mapped using the Kallisto [*10*] and Sleuth [*11*]. Functional enrichment analysis of differentially expressed genes is based on clusters of orthologous groups (COG) categories provided by the IMG-ER annotations [*12*]. GO enrichment analysis of differentially expressed genes was performed via PantherDB [*13,14*].

Generation of chromosomal point mutations. Point mutations were made using the CRISPR Cas9 system [*15,16*]. Briefly, cells were transformed with the pKD46-Cas9-RecA-Cure, which allows for the expression of the Cas9 protein for double stranded DNA breaks and the RecA protein to assist homologous recombination. A single transformant was picked and inoculated in liquid culture to make electro-competent cells. Then cells that carried the pKD46-Cas9-RecA-Cure plasmid were transformed with both the pCRISPR plasmid containing the specific guide

RNA and the double stranded DNA repair fragment that carried the desired sequence. The repair fragment also carries a silent mutation to remove the PAM site and a phosphatioate modification at both the 5′- and 3′-ends. Transformations were recovered and plated on plates with appropriate selection markers. Colonies were validated by Sanger sequencing.

DH1Δ*5* _2406_*pcnB*(R149L) - CGC → CTC mutation at position 446 that corresponds to the *pcnB*(R149L) mutation was made in the strain DH1Δ5 using the CRISPR Cas9 system. DH1Δ*5* was transformed with pKD46-Cas9-RecA-Cure and plated on appropriate antibiotic resistant LB agar platse and incubated at 30 °C overnight. A single colony was picked and inoculated in 10 mL LB liquid media with appropriate antibiotics overnight at 30 °C. The overnight culture was then diluted in fresh LB media with 0.2% *w/v* of arabinose to an OD_{600} ~ 0.01 to induce RecA expression. Once cultures reached an OD_{600} of 0.4,cells were harvested to make electro-competent cells. DH1_ pKD46-Cas9-RecA-Cure electro-competent cells were then transformed with pCRISPR_gibson_1guide_2409pcnB (#2784) plasmid and repair fragments (P1227_2406_pcnB RF_R and P1226_2406_pcnB RF_F). Cells were recovered at 30 °C for 1.5 h and plated on appropriate antibiotic selection LB agar plate. Plate was incubated at 30 °C overnight. Colonies were picked and validated by Sanger sequencing (Quintara Biosciences). Once sequences were confirmed, a single colony was inoculated in 10 mL LB media with 0.05 mM IPTG to induce the guide to target and cure the pCRISPR_gibson_1guide_2409pcnB (#2784) plasmid. Once the pCRISPR_gibson_1guide_2409pcnB (#2784) plasmid was cured, cells were grown at 37 °C to cure the pKD46-Cas9-RecA-Cure plasmid, which contains a temperature sensitive origin of replication.

DH1Δ*5* _2406_*rpoC*(M466L) – ATG →CTG mutation at position 1396 that corresponds to the *rpoC*(M466L) mutation was made in the strain DH1Δ5 using the CRISPR Cas9 system as described above. The pCRISPR_gibson_1guide_2406_rpoC (#2794) plasmid and repair fragments (P1231_2406_rpoC_RF_R and P1230_2406_rpoC_RF_F) were used.

DH1Δ*5* _2406_*pcnB*(R149L)_*rpoC*(M466L) – the double mutant was made using the CRISPR Cas9 system as described above in a sequencial manner. Once the pcnB(R149L) mutation was confirmed and the pCRISPR_gibson_1guide_2409pcnB (#2784) plasmid was cured, cells were grown up to make electro-compotent cells. Cells were then transformed with the pCRISPR_gibson_1guide_2406_rpoC (#2794) construct and repair fragments (P1231_2406_rpoC_RF_R and P1230_2406_rpoC_RF_F). Once the desired mutations were confirmed with sequencing, cells were growing in IPTG-containing media to cure the

pCRISPR_gibson_1guide_2406_rpoC (#2794) plasmid. Finally, cells were grown at 37 °C to cure the pKD46-Cas9-RecA-Cure plasmid, which contains a temperature sensitive origin of replication.

Metabolomics. Five replicates of cultures were grown as described previously for production in shake flasks and harvested 24 h after induction. Cultures were centrifuged at 20,817 × g for 1 min at 4 °C with an Eppendorf 5417R Centrifuge (Hamburg, Germany). The supernatants were decanted immediately and cell pellets were flash frozen with liquid nitrogen and stored at –80 °C until extraction. Pellets were extracted with 90% *v/v* methanol with 0.1% *v/v* formic acid containing $D_3{}^{15}N$-serine (0.01 mg/mL; Cambridge Isotope Laboratories, Inc., DNLM6863) to a final concentration of 1 mg biomass/μL of extraction buffer. The mass of the biomass was calculated using the standard value for *E. coli* of 23.8 mg/OD_{600}. Samples were vortexed for 15 s, incubated at –80 °C for 30 min, and then thawed at –20 °C for 30 min. The vortex-freeze-thaw cycle was repeated for a total of five times. At the end of this procedure, the lysed cells were centrifuged at 20,817 × g at 4 °C for 5 min and the supernatant collected for LC-MS/MS analysis. Metabolomic analyses were performed as previously reported [*15*]. Briefly, supernatant was collected and frozen at –80 °C until analysis. 20 μL of supernatant was analyzed by single-reaction monitoring (SRM)-based targeted LC-MS/MS. Metabolite separation was performed using normal-phase chromatography using a Luna-5 mm NH_2 column (50 mm × 4.60 mm, Phenomenex). Mobile phases were run as follows: Buffer A, acetonitrile; Buffer B, 95:5 water/ acetonitrile with 0.1% formic acid or 0.2% ammonium hydroxide with 50 mM ammonium acetate for positive and negative ionization modes, respectively. Flow rate began at 0.2 mL/min for 2 min, followed by a gradient starting at 0 %B and increasing linearly to 100 %B over the course of 13 min with a flow rate of 0.7 mL/min, followed by an isocratic gradient of 100 %B for 10 min before equilibrating for 5 min at 0 %B with a flow rate of 0.7 mL/min. MS analysis was performed using an electrospray ionization (ESI) source on an Agilent 6430 QQQ LC-MS/MS.Drying gas temperature 350 °C, drying gas flow rate was 10 L/min, the nebulizer pressure was 35 psi, capillary voltage was 3.0 kV, and fragmentor voltage was 100 V. Representative metabolites were quantified by SRM of the transitions from precursor to product ions at associated collision energies. Data was analyzed using Agilent Qualitative Analysis software by calculating area under the curve.

Tables and Figures

Table S1. Strains, oligonucleotides, and sequences. (A) *E. coli* strains. (B) Plasmids and gene sequences (C). Oligos for sequencing and cloning (D) aldehyde dehydrogenases sequences. (E) gBlock sequences. (F) Sequence for DNA probes for rRNA depleteion. (G) Open reading frame for *pncB* and *rpoC*

A. *E. coli* strains

A1. Parent and constructed strains

Organism	Name	Description	Source
E. coli	DH10B	F- endA1 recA1 galE15 galK16 nupG rpsL ΔlacX74 Φ80lacZΔM15 araD139 Δ(ara,leu)7697 mcrA Δ(mrr-hsdRMS-mcrBC) λ-	Invitrogen
E. coli	BL21 (DE3) Star T1^R	RNaseE mutation to increase mRNA stability, Δ*fhuA*	Invitrogen
E. coli	DH1Δ*5*	DH1 Δ*ackA-pta* Δ*adhE* Δ*ldhA* Δ*poxB* Δ*frdBC*	This study
E. coli	BW25113Δ*5*-T1^R	BW25113 Δ*ackA-pta* Δ*adhE* Δ*ldhA* Δ*poxB* Δ*frdBC* Δ*fhuA*, P1 transduced *fhuA*:Km^R from 1637 parent to 1435 then recycled Km marker	This study
E. coli	DH1Δ5_2406_pcnB(R149L)	DH1 Δ*ackA-pta* Δ*adhE* Δ*ldhA* Δ*poxB* Δ*frdBC pcnB*(R19L)	This study
E. coli	DH1Δ5_2406_rpoC(M466L)	DH1 Δ*ackA-pta* Δ*adhE* Δ*ldhA* Δ*poxB* Δ*frdBC rpoC*(M466L)	This study
E. coli	DH1Δ5_2406_pcnB(R149L)_ rpoC(M466L)	DH1 Δ*ackA-pta* Δ*adhE* Δ*ldhA* Δ*poxB* Δ*frdBC pcnB*(R19L) *rpoC*(M466L)	This study

A2. Strains isolated from evolutions. All strains contained the pBBR1-AceEF.Lpd plasmid (#339) for overexpression of the pyruvate dehydrogenase complex. Parent strains for *n*-butanol production contained the pT5T33-Bu2 plasmid (#499) and one of the following three plasmids: pCWori.trc-ter-aldh46.adh2 (#1866), pCWori.trc-ter-aldh46.adh8 (#1867), or pCWori.trc-aldh21.adh2 (#2456). The parent strain for HB production contained the pT533-phaA (#2080) and pCWori.trc-aldh7.adh2 (#2076) plasmids. The parent strain for BDO production contained the pT533-phaA.phaB (#1319) plasmid and one of the following three plasmids: pCWori.trc-aldh7.adh2 (#2076), pCWori.trc-aldh3.adh22 (#2468), or pCWori.trc-sadh1-aldh7.adh2 (#2430).

An identifier number was used during isolation of individual clones from an evolution experiment consisting of plasmid combination (A, B, C, D), flask number-dilution number-clone.

Product	Parent	Plasmids	Media	Identifier	No.
n-Butanol	DH1Δ*5*	339-499-1866	LB/2.5% Glc	A1-D45-2	2616
	DH1Δ*5*	339-499-1866	LB/2.5% Glc	A3-D26-2	2619
	DH1Δ*5*	339-499-1866	LB/2.5% Glc	A3-D26-3	2620
	DH1Δ*5*	339-499-1866	LB/2.5% Glc	A3-D35-1	2621
	DH1Δ*5*	339-499-1866	LB/2.5% Glc	A3-D35-2	2622
	DH1Δ*5*	339-499-2456	LB/2.5% Glc	C1-D41-1	2625
	DH1Δ*5*	339-499-2456	LB/2.5% Glc	C1-D41-3	2626
	DH1Δ*5*	339-499-2456	LB/2.5% Glc	C3-D35-1	2628
	DH1Δ*5*	339-499-2456	LB/2.5% Glc	C3-D41-1	2629
	DH1Δ*5*	339-499-2456	LB/2.5% Glc	C3-D41-6	2630
	DH1Δ*5*	339-499-2456	M9/10% LB/2.5% Glc	D15-12-1	2685
	DH1Δ*5*	339-499-2456	M9/10% LB/2.5% Glc	D15-12-2	2686
	DH1Δ*5*	339-499-2456	M9/10% LB/2.5% Glc	D15-12-3	2687
	BW25113Δ*5*	339-499-2456	M9/10% LB/2.5% Glc	C1-D4-3	2726
	BW25113Δ*5*	339-499-2456	M9/10% LB/2.5% Glc	D4-C3-3	2727
	BW25113Δ*5*	339-499-1866	M9/10% LB/2.5% Glc	D17-A3-1	2728
	BW25113Δ*5*	339-499-1867	M9/10% LB/2.5% Glc	D17-B3-1	2729
	BW25113Δ*5*	339-499-2456	M9/10% LB/2.5% Glc	D17-C1-3	2730
	BW25113Δ*5*	339-499-2456	M9/10% LB/2.5% Glc	D17-C3-2	2731
	BW25113Δ*5*	339-499-2456	M9/2.5% Glc	C1-D9-1	2748
	DH1Δ5	339-499-2456	M9/2.5% Glc	C1-D11-2	2750
HB	DH1Δ*5*	339-2080-2076	TB/2.5% Glc	A3-D17-4	2403
	DH1Δ*5*	339-2080-2076	TB/2.5% Glc	A3-D26-2	2404
BDO	DH1Δ*5*	339-1319-2076	TB/2.5% Glc	B1-D17-2	2405
	DH1Δ*5*	339-1319-2076	TB/2.5% Glc	B1-D26-3	2406
	DH1Δ*5*	339-1319-2076	TB/2.5% Glc	B3-D26-4	2407
	DH1Δ*5*	339-1319-2430	TB/2.5% Glc	C1-D17-4	2408
	DH1Δ*5*	339-1319-2430	TB/2.5% Glc	C3-D17-3	2409
	DH1Δ*5*	339-1319-2430	TB/2.5% Glc	C2-D26-1	2410
	DH1Δ*5*	339-1319-2430	TB/2.5% Glc	C3-D26-2	2411
	DH1Δ*5*	339-1319-2468	TB/2.5% Glc	D3-D17-2	2412

B. Plasmids

B1. Monofunctional ALDHs (BDO). All constructs were constructed using pCDF3-ter.adhE2 as the parent using Gibson assembly. pCDF3-ter.adhE2 contains the *ter* gene driven by two P_{tac} promoters, the Sp resistant marker, and the CloDF13cop3 origin. This backbone plasmid was digested with EcoRI and HindIII for *aldhX* insertion. The *aldhX* gene was inserted upstream of the ADH domain of AdhE2, separated by a stop codon, leaving some residual expression of the ADH domain. The pCDF3-ter.aldhX plasmids were used to screen for *n*-butanol production. A second set of plasmids, pCDF3-aldhX, was generated without the *ter* gene to screen for BDO

and HB production and are listed below. The oligos ter delete GO5 and ter delete GO6 were inserted into the BamHI-EcoRI restriction sites of pCDF3-ter.aldhX to remove the *ter* gene and generate pCDF3-aldhX.

Name	Marker	Origin	Promoter	Description	Number
pCDF3-aldh1	Sp	CloDF13cop3	double P_{Tac}	Codon-optimized coenzyme A acylating aldehyde dehydrogenase *Clostridium beijerinckii*, from Calysta Biosystems, contains unannotated C-terminal adhE2 fragment after aldh1, GI:4884855	1647
pCDF3-aldh2	Sp	CloDF13cop3	double P_{Tac}	Codon-optimized ethanolamine utilization protein EutE *Escherichia coli* CFT073, from Calysta Biosystems, contains unannotated C-terminal adhE2 fragment after aldh2, GI:26250354	1648
pCDF3-aldh3	Sp	CloDF13cop3	double P_{Tac}	Codon-optimized butyraldehyde dehydrogenase from *Clostridium saccharoperbutylacetonicum* N1-4(HMT), from Calysta Biosystems, contains unannotated C-terminal adhE2 fragment after aldh3, GI:31075383	1649
pCDF3-aldh4	Sp	CloDF13cop3	double P_{Tac}	Codon-optimized ethanolamine utilization protein eutE *Vibrio shilonii* AK1, from Calysta Biosystems, contains unannotated C-terminal adhE2 fragment after aldh4, GI:149190407	1650
pCDF3-aldh5	Sp	CloDF13cop3	double P_{Tac}	Codon-optimized hypothetical protein RUMGNA_01022 from *Ruminococcus gnavus* ATCC 29149, from Calysta Biosystems, contains unannotated C-terminal adhE2 fragment after aldh5, GI:154503198	1651
pCDF3-aldh6	Sp	CloDF13cop3	double P_{Tac}	Codon-optimized hypothetical protein CLOBOL_07248 from *Clostridium bolteae* ATCC BAA-613, from Calysta Biosystems, contains unannotated C-terminal adhE2 fragment after aldh6, GI:160942363	1652
pCDF3-aldh7	Sp	CloDF13cop3	double P_{Tac}	Codon-optimized ethanolamine utilization protein EutE from *Clostridium botulinum* B str. Eklund 17B, from Calysta Biosystems, contains unannotated C-terminal adhE2 fragment after aldh7, GI:187934965	1653
pCDF3-aldh8	Sp	CloDF13cop3	double P_{Tac}	Codon-optimized coenzyme A acylating aldehyde dehydrogenase from *Clostridium saccharobutylicum*,	1654

				from Calysta Biosystems, contains unannotated C-terminal adhE2 fragment after aldh8, GI:189310620	
pCDF3-aldh9	Sp	CloDF13cop3	double P_{Tac}	Codon-optimized ethanolamine utilization protein EutE from *Clostridium botulinum* E1 str. 'BoNT E Beluga', from Calysta Biosystems, contains unannotated C-terminal adhE2 fragment after aldh9, GI:251780016	1655
pCDF3-aldh10	Sp	CloDF13cop3	double P_{Tac}	Codon-optimized aldehyde dehydrogenase from *Clostridium carboxidivorans* P7, from Calysta Biosystems, contains unannotated C-terminal adhE2 fragment after aldh10, GI:255526882	1656
pCDF3-aldh11	Sp	CloDF13cop3	double P_{Tac}	Codon-optimized aldehyde dehydrogenase from *Clostridium saccharolyticum* WM1, from Calysta Biosystems, contains unannotated C-terminal adhE2 fragment after aldh11, GI:302386203	1657
pCDF3-aldh12	Sp	CloDF13cop3	double P_{Tac}	Codon-optimized aldehyde dehydrogenase from *Geobacillus* sp. Y4.1MC1, from Calysta Biosystems, contains unannotated C-terminal adhE2 fragment after aldh12, GI:312110932	1658
pCDF3-aldh13	Sp	CloDF13cop3	double P_{Tac}	Codon-optimized acetaldehyde dehydrogenase (acetylating) from *Clostridium* sp. DL-VIII, from Calysta Biosystems, contains unannotated C-terminal adhE2 fragment after aldh13, GI:359413662	1659
pCDF3-aldh14	Sp	CloDF13cop3	double P_{Tac}	Codon-optimized hypothetical protein HMPREF9942_01197 from *Fusobacterium nucleatum* subsp. *animalis* F0419, from Calysta Biosystems, contains unannotated C-terminal adhE2 fragment after aldh14, GI:371960349	1660
pCDF3-aldh15	Sp	CloDF13cop3	double P_{Tac}	Codon-optimized hypothetical protein HMPREF0402_00608 from *Fusobacterium* sp. 12_1B, from Calysta Biosystems, contains unannotated C-terminal adhE2 fragment after aldh15, GI:373496187	1661
pCDF3-aldh46	Sp	CloDF13cop3	double P_{Tac}	Codon-optimized aldehyde dehydrogenase from *Clostridium beijerinckii* NCIMB 8052, from Calysta Biosystems, contains unannotated C-terminal adhE2 fragment after aldh46, GI:150018649	1662

B2. Primary ADH screening (n-butanol). pCWori.trc-ter-aldh46 was constructed as a parent plasmid for the construction of the pCWori.trc-ter-aldh46.ADH series of constructs. pCWori.trc-ter-aldh46 was constructed by Gibson assembly with the aldh46.x G1 gBlock and HindIII digested pCWori-ter-trc.aldh46.adh. pCWori.trc-ter-aldh46 contains the *ter* gene driven by two P_{tac} promoters, the *aldh46* gene driven by the P_{trc} promter, the Cb resistance marker, and the ColE1 origin. pCWori.trc-ter-aldh46 was then digested with SpeI and XbaI for the insertion of corresponding ADHs. All ADHs were synthesized on gBlocks along with the apporiate overhang sequences for Gibson assembly.

Name	Marker	Origin	Promoter	Description	Number
pCWori.trc-ter-aldh46.adh2	Cb	ColE1	double P_{Tac}, P_{Trc}	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized ALDH from *Clostridium beijerinckii* NCIMB 8052 in operon with ADH from *Campylobacter fetus* subsp. *fetus* (strain 82-40) under Trc promoter	1866
pCWori.trc-ter-aldh46.adh3	Cb	ColE1	double P_{Tac}, P_{Trc}	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized ALDH from *Clostridium beijerinckii* NCIMB 8052 in operon with codon-optimized ADH from *Olsenella* sp. oral taxon 809 str. F0356 under Trc promoter	1911
pCWori.trc-ter-aldh46.adh4	Cb	ColE1	double P_{Tac}, P_{Trc}	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized ALDH from *Clostridium beijerinckii* NCIMB 8052 in operon with codon-optimized ADH from *Anaerofustis stercorihominis* DSM 17244 under Trc promoter	1912
pCWori.trc-ter-aldh46.adh5	Cb	ColE1	double P_{Tac}, P_{Trc}	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized ALDH from *Clostridium beijerinckii* NCIMB 8052 in operon with codon-optimized ADH from *Bacillus subtilis* (strain 168) under Trc promoter	1917

pCWori.trc-ter-aldh46.adh6	Cb	ColE1	double P_{Tac}, P_{Trc}	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized ALDH from *Clostridium beijerinckii* NCIMB 8052 in operon with codon-optimized ADH from *Faecalibacterium prausnitzii* M21/2 under Trc promoter	1918
pCWori.trc-ter-aldh46.adh7	Cb	ColE1	double P_{Tac}, P_{Trc}	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized ALDH from *Clostridium beijerinckii* NCIMB 8052 in operon with codon-optimized ADH from *Erysipelotrichaceae bacterium* 3_1_53 under Trc promoter	1919
pCWori.trc-ter-aldh46.adh8	Cb	ColE1	double P_{Tac}, P_{Trc}	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized ALDH from *Clostridium beijerinckii* NCIMB 8052 in operon with codon-optimized ADH from *Olsenella uli* (strain ATCC 49627) under Trc promoter	1913
pCWori.trc-ter-aldh46.adh9	Cb	ColE1	double P_{Tac}, P_{Trc}	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized ALDH from *Clostridium beijerinckii* NCIMB 8052 in operon with codon-optimized ADH from *Streptococcus gallolyticus* (strain ATCC 43143 / F-1867) under Trc promoter	1914
pCWori.trc-ter-aldh46.adh10	Cb	ColE1	double P_{Tac}, P_{Trc}	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized ALDH from *Clostridium beijerinckii* NCIMB 8052 in operon with codon-optimized ADH from *Desulfurispirillum indicum* (strain ATCC BAA-1389 / S5) under Trc promoter	1920
pCWori.trc-ter-aldh46.adh12	Cb	ColE1	double P_{Tac}, P_{Trc}	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized ALDH from *Clostridium beijerinckii* NCIMB 8052 in operon with codon-optimized ADH from *Clostridium spiroforme* DSM	1921

				1552 under Trc promoter	
pCWori.trc-ter-aldh46.adh13	Cb	ColE1	double P_{Tac}, P_{Trc}	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized ALDH from *Clostridium beijerinckii* NCIMB 8052 in operon with codon-optimized ADH from *Tetragenococcus halophilus* (strain DSM 20338) under Trc promoter	1915
pCWori.trc-ter-aldh46.adh14	Cb	ColE1	double P_{Tac}, P_{Trc}	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized ALDH from *Clostridium beijerinckii* NCIMB 8052 in operon with codon-optimized ADH from *Succinatimonas hippei* YIT 12066 under Trc promoter	1906
pCWori.trc-ter-aldh46.dhaT2	Cb	ColE1	double P_{Tac}, P_{Trc}	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized ALDH from *Clostridium beijerinckii* NCIMB 8052 in operon with codon-optimized dhaT from *Halanaerobium hydrogeniformans* (*Halanaerobium* sp. (strain *sapolanicus*)) under Trc promoter	1907
pCWori.trc-ter-aldh46.dhaT3	Cb	ColE1	double P_{Tac}, P_{Trc}	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized ALDH from *Clostridium beijerinckii* NCIMB 8052 in operon with codon-optimized dhaT from *Citrobacter freundii* under Trc promoter	1908
pCWori.trc-ter-aldh46.dhaT4	Cb	ColE1	double P_{Tac}, P_{Trc}	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized ALDH from *Clostridium beijerinckii* NCIMB 8052 in operon with codon-optimized dhaT from *Clostridium novyi* (strain NT)i under Trc promoter	1909
pCWori.trc-ter-aldh46.dhaT5	Cb	ColE1	double P_{Tac}, P_{Trc}	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized ALDH from *Clostridium beijerinckii*	1910

				NCIMB 8052 in operon with codon-optimized dhaT from *Pelobacter carbinolicus* (strain DSM 2380 / Gra Bd 1) under Trc promoter	
pCWori.trc-ter-aldh46.dhaT6	Cb	ColE1	double P_{Tac}, P_{Trc}	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized ALDH from *Clostridium beijerinckii* NCIMB 8052 in operon with codon-optimized dhaT from *Pelotomaculum thermopropionicum* (strain DSM 13744 / JCM 10971 / SI) under Trc promoter	1922
pCWori.trc-ter-aldh46.dhaT7	Cb	ColE1	double P_{Tac}, P_{Trc}	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized ALDH from *Clostridium beijerinckii* NCIMB 8052 in operon with codon-optimized dhaT from *Clostridium perfringens* D str. JGS1721 under Trc promoter	1923
pCWori.trc-ter-aldh46.dhaT8	Cb	ColE1	double P_{Tac}, P_{Trc}	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized ALDH from *Clostridium beijerinckii* NCIMB 8052 in operon with codon-optimized dhaT from *Ilyobacter polytropus* (strain DSM 2926 / CuHBu1) under Trc promoter	1924

B3. ALDH.ADH pairs. The pCWori.trc-ter-aldhX.adhY series of plasmids was constructed using Gibson Assembly or Golden gate assembly. For constructs made by Gibson assembly, the pCWori.trc-ter-aldh46.adhY series of plasmids were used as the parent plasmids. The parent plasmid was digested with EcoRI and XbaI to remove *aldh46* to insert the corresponding *aldhX* gene. The *aldhX* gene was amplified with specific primers to generate apporiate overhang for the Gibsion reaction. The pCDF3-aldh series of plasmid were used as PCR template for the ALDHs amplication. For constructs made by Golden Gate assembly, *aldhX* was amplified with the primers indicated in the primer table below using pCDF3-aldhX as a template. *adhY* was amplified with the primers indicated in the primer table below using pCWori.trc-ter-aldh46.adhY as a template for *adh2/8/12*. *adh15-22* were amplified using the gBlocks listed in *Table S1.E1* as

a template. The two PCR products were then inserted into the Golden Gate entry vector, pCWori.trc-ter-RFP, digested with BsaI.

Primer Table S1.B3

Combination	*aldh* primers	*adh* primers	Assembly Method
aldh3.adh2	aldh3 GGF1 aldh3.(adh2) GGR1	(aldh3).adh2 GGF1 adh2 GGR1	Golden Gate
aldh3.adh8	aldh3 GGF1 aldh3.(adh8) GGR1	(aldh3).adh8 GGF1 adh8 GGR1	Golden Gate
aldh3.adh12	aldh3 GF1 aldh3.adh12 GR1	from backbone	Gibson
aldh6.adh2	aldh6 GGF1 aldh6.(adh2) GGR1	(aldh6).adh2 GGF1 adh2 GGR1	Golden Gate
aldh6.adh8	aldh6 GF1 aldh6.adh8 GR1	from backbone	Gibson
aldh6.adh12	aldh6 GGF1 aldh6.(adh12) GGR1	(aldh14).adh12 GGF1 adh12 GGR1	Golden Gate
aldh7.adh2	aldh7 GF1 aldh7.adh2 GR1 aldh7.adh2 GO1 aldh7.adh2 GO2	from backbone	Gibson
aldh7.adh8	aldh7 GF1 aldh7.adh8 GR1 aldh7.adh8 GO1 aldh7.adh8 GO2	from backbone	Gibson
aldh7.adh12	aldh7 GF1 aldh7.adh12 GR1 aldh7.adh12 GO1 aldh7.adh12 GO2	from backbone	GIbson
aldh9.adh2	aldh9 GGF1 aldh9.(adh2) GGR1	(aldh9).adh2 GGF1 adh2 GGR1	Golden Gate
aldh9.adh8	aldh9 GF1 aldh9.adh8 GR1	from backbone	GIbson
aldh9.adh12	aldh9 GF1 aldh9.adh12 GR1	from backbone	Gibson
aldh14.adh2	aldh14 GGF1 aldh14.(adh2) GGR1	(aldh14).adh2 GGF1 adh2 GGR1	Golden Gate
aldh14.adh8	aldh14 GGF1 aldh14.(adh8) GGR1	(aldh14).adh8 GGF1 adh8 GGR1	Golden Gate

aldh14.adh12	aldh14 GGF1 aldh14.(adh12) GGR1	(aldh14).adh12 GGF1 adh12 GGR1	Golden Gate
aldh3.adh15	aldh3 GGF1 aldh3.(adh) GGR1	adh15 GGF1 adh15 GGR1	Golden Gate
aldh3.adh17	aldh3 GGF1 aldh3.(adh) GGR1	adh17 GGF1 adh17 GGR1	Golden Gate
aldh3.adh18	aldh3 GGF1 aldh3.(adh) GGR1	adh18 GGF1 adh18 GGR1	Golden Gate
aldh3.adh19	aldh3 GGF1 aldh3.(adh) GGR1	adh19 GGF1 adh19 GGR1	Golden Gate
aldh3.adh21	aldh3 GGF1 aldh3.(adh) GGR1	adh21 GGF1 adh21 GGR1	Golden Gate
aldh3.adh22	aldh3 GGF1 aldh3.(adh) GGR1	adh22 GGF1 adh22 GGR1	Golden Gate
aldh7.adh15	aldh round 1 library GGF1 aldh7.(adh) GGR1	adh15 GGF1 adh15 GGR1	Golden Gate
aldh7.adh18	aldh round 1 library GGF1 aldh7.(adh) GGR1	adh18 GGF1 adh18 GGR1	Golden Gate
aldh7.adh19	aldh round 1 library GGF1 aldh7.(adh) GGR1	adh19 GGF1 adh19 GGR1	Golden Gate
aldh7.adh20	aldh round 1 library GGF1 aldh7.(adh) GGR1	adh20 GGF1 adh20 GGR1	Golden Gate
aldh7.adh21	aldh round 1 library GGF1 aldh7.(adh) GGR1	adh21 GGF1 adh21 GGR1	Golden Gate
aldh7.adh22	aldh round 1 library GGF1 aldh7.(adh) GGR1	adh22 GGF1 adh22 GGR1	Golden Gate
aldh46.adh19	aldh round 1 library GGF1 aldh46.(adh) GGR1	adh19 GGF1 adh19 GGR1	Golden Gate
aldh46.adh20	aldh round 1 library GGF1 aldh46.(adh) GGR1	adh20 GGF1 adh20 GGR1	Golden Gate
aldh46.adh21	aldh round 1 library GGF1 aldh46.(adh) GGR1	adh21 GGF1 adh21 GGR1	Golden Gate

Plasmid Table S1.B3

Name	Marker	Origin	Promoter	Description	No.
pCWori.trc-ter-aldh3.adh2	Cb	ColE1	double tac, trc	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized butyraldehyde dehydrogenase from *Clostridium saccharoperbutylacetonicum* N1-4(HMT) in operon with ADH *from Campylobacter fetus* subsp. fetus (strain 82-40) under Trc promoter	2096
pCWori.trc-ter-aldh6.adh2	Cb	ColE1	double tac, trc	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized hypothetical protein CLOBOL_07248 from *Clostridium bolteae* ATCC BAA-613 in operon with ADH from *Campylobacter fetus* subsp. *fetus* (strain 82-40) under Trc promoter	2099
pCWori.trc-ter-aldh7.adh2	Cb	ColE1	double tac, trc	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized ethanolamine utilization protein EutE from *Clostridium botulinum* B str. Eklund 17B in operon with ADH from *Campylobacter fetus* subsp. *fetus* (strain 82-40) under Trc promoter	2076
pCWori.trc-ter-aldh9.adh2	Cb	ColE1	double tac, trc	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized ethanolamine utilization protein EutE from Clostridium botulinum E1 str. 'BoNT E Beluga' in operon with ADH from *Campylobacter fetus* subsp. *fetus* (strain 82-40) under Trc promoter	2103
pCWOri.trc-ter-aldh14.adh2	Cb	ColE1	double tac, trc	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized hypothetical protein HMPREF9942_01197 from *Fusobacterium nucleatum* subsp. *animalis* F0419 in operon with ADH from *Campylobacter fetus subsp. fetus* (strain 82-40) under Trc promoter	2106
pCWori.trc-ter-aldh3.adh8	Cb	ColE1	double tac, trc	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized butyraldehyde dehydrogenase from *Clostridium saccharoperbutylacetonicum* N1-4(HMT) in operon with ADH from *Olsenella uli* (strain ATCC 49627) under Trc promoter	2097

pCWori.trc-ter-aldh6.adh8	Cb	ColE1	double tac, trc	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized hypothetical protein CLOBOL_07248 from *Clostridium bolteae* ATCC BAA-613 in operon with ADH from *Olsenella uli* (strain ATCC 49627 under Trc promoter	2100
pCWori.trc-ter-aldh7.adh8	Cb	ColE1	double tac, trc	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized ethanolamine utilization protein EutE from *Clostridium botulinum* B str. Eklund 17B in operon with ADH from *Olsenella uli* (strain ATCC 49627 under Trc promoter	2101
pCWori.trc-ter-aldh9.adh8	Cb	ColE1	double tac, trc	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized ethanolamine utilization protein EutE from *Clostridium botulinum* E1 str. 'BoNT E Beluga' in operon with ADH from *Olsenella uli* (strain ATCC 49627 under Trc promoter	2104
pCWori.trc-ter-aldh14.adh8	Cb	ColE1	double tac, trc	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized hypothetical protein HMPREF9942_01197 from *Fusobacterium nucleatum* subsp. animalis F0419 in operon with ADH from *Olsenella uli* (strain ATCC 49627 under Trc promoter	2107
pCWori.trc-ter-aldh3.adh12	Cb	ColE1	double tac, trc	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized butyraldehyde dehydrogenase from *Clostridium saccharoperbutylacetonicum* N1-4(HMT) in operon with ADH from *Clostridium spiroforme* DSM 1552 under Trc promoter	2098
pCWori.trc-ter-aldh7.adh12	Cb	ColE1	double tac, trc	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized ethanolamine utilization protein EutE from *Clostridium botulinum* B str. Eklund 17B in operon with ADH from *Clostridium spiroforme* DSM 1552 under Trc promoter	2102
pCWori.trc-ter-aldh9.adh12	Cb	ColE1	double tac, trc	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized ethanolamine utilization protein EutE from *Clostridium botulinum* E1 str. 'BoNT E Beluga' in operon with ADH from *Clostridium spiroforme* DSM 1552 under Trc promoter	2105

pCWori.trc-ter-aldh3.adh15	Cb	ColE1	double tac, trc	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized butyraldehyde dehydrogenase from *Clostridium saccharoperbutylacetonicum* N1-4(HMT) in operon with ADH from *Desulfuromonas acetoxidans* DSM 684 under Trc promoter	2463
pCWori.trc-ter-aldh3.adh17	Cb	ColE1	double tac, trc	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized butyraldehyde dehydrogenase from *Clostridium saccharoperbutylacetonicum* N1-4(HMT) in operon with ADH from *Dickeya dadantii* (strain Ech586) under Trc promoter	2464
pCWori.trc-ter-aldh3.adh18	Cb	ColE1	double tac, trc	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized butyraldehyde dehydrogenase from *Clostridium saccharoperbutylacetonicum* N1-4(HMT) in operon with ADH from *Haemophilus parainfluenzae* ATCC 33392 under Trc promoter	2465
pCWori.trc-ter-aldh3.adh19	Cb	ColE1	double tac, trc	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized butyraldehyde dehydrogenase from *Clostridium saccharoperbutylacetonicum* N1-4(HMT) in operon with ADH from *Enterococcus saccharolyticus* 30_1 under Trc promoter	2466
pCWori.trc-ter-aldh3.adh21	Cb	ColE1	double tac, trc	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized butyraldehyde dehydrogenase from *Clostridium saccharoperbutylacetonicum* N1-4(HMT) in operon with ADH from *Erysipelotrichaceae* bacterium 3_1_53 under Trc promoter	2467
pCWori.trc-ter-aldh3.adh22	Cb	ColE1	double tac, trc	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized butyraldehyde dehydrogenase from *Clostridium saccharoperbutylacetonicum* N1-4(HMT) in operon with ADH from *Clostridium* sp. SS2/1 under Trc promoter	
pCWori.trc-ter-aldh7.adh15	Cb	ColE1	double tac, trc	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized ethanolamine utilization protein EutE from *Clostridium botulinum* B str. Eklund 17B in operon with ADH from *Desulfuromonas acetoxidans* DSM 684 under Trc promoter	2479

pCWori.trc-ter-aldh7.adh18	Cb	ColE1	double tac, trc	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized ethanolamine utilization protein EutE from *Clostridium botulinum* B str. Eklund 17B in operon with ADH from *Haemophilus parainfluenzae* ATCC 33392 under Trc promoter	2482
pCWori.trc-ter-aldh7.adh19	Cb	ColE1	double tac, trc	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized ethanolamine utilization protein EutE from *Clostridium botulinum* B str. Eklund 17B in operon with ADH from *Enterococcus saccharolyticus* 30_1 under Trc promoter	2483
pCWori.trc-ter-aldh7.adh20	Cb	ColE1	double tac, trc	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized ethanolamine utilization protein EutE from *Clostridium botulinum* B str. Eklund 17B in operon with ADH from *Clostridium botulinum* (strain Alaska E43 / Type E3) under Trc promoter	2484
pCWori.trc-ter-aldh7.adh21	Cb	ColE1	double tac, trc	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized ethanolamine utilization protein EutE from *Clostridium botulinum* B str. Eklund 17B in operon with ADH from *Erysipelotrichaceae* bacterium 3_1_53 under Trc promoter	2485
pCWori.trc-ter-aldh7.adh22	Cb	ColE1	double tac, trc	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized ethanolamine utilization protein EutE from *Clostridium botulinum* B str. Eklund 17B in operon with ADH from ADH from *Clostridium* sp. SS2/1 under Trc promoter	2486
pCWori.trc-ter-aldh46.adh19	Cb	ColE1	double tac, trc	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized codon-optimized ALDH from *Clostridium beijerinckii* NCIMB 8052 in operon with ADH from *Enterococcus saccharolyticus* 30_1 under Trc promoter	2491
pCWori.trc-ter-aldh46.adh20	Cb	ColE1	double tac, trc	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized codon-optimized ALDH from *Clostridium beijerinckii* NCIMB 8052 in operon with ADH from *Clostridium botulinum* (strain Alaska E43 / Type E3) under Trc promoter	2492

pCWori.trc-ter-aldh46.adh21	Cb	ColE1	double tac, trc	Codon-optimized Ter from *Treponema denticola* under double tac promoter, codon-optimized codon-optimized ALDH from *Clostridium beijerinckii* NCIMB 8052 in operon with ADH from *Erysipelotrichaceae* bacterium 3_1_53 under Trc promoter	2493

B4. Secondary ADHs (BDO). The pCWori.trc-sADH-aldh7.adh2 series of plasmids (SADH1-16) were constructed by replaceing the *ter* gene in the NdeI and XhoI site of the pCWori.trc-ter-aldh7.adh2 parent plasmid with the corresponding gBlock sequences (*Table S1.E2*).

Name	Marker	Origin	Promoter	Description	No.
pCWori.trc-sadh1-aldh7.adh2	Cb	ColE1	P_{Trc}, double P_{Tac}	SADH1 is from *Pichia kudriavzevii*. Accession # KGK36767.1	2430
pCWori.trc-sadh2-aldh7.adh2	Cb	ColE1	P_{Trc}, double P_{Tac}	SADH2 is from *Pyrococcus furiosus* DSM 3638. Accession # WP_011011186.1	2431
pCWori.trc-sadh3-aldh7.adh2	Cb	ColE1	P_{Trc}, double P_{Tac}	SADH3 is from *Cupriavidus necator*. Accession # WP_011614641.1	2432
pCWori.trc-sadh4-aldh7.adh2	Cb	ColE1	P_{Trc}, double P_{Tac}	SADH4 is from *Thermoanaerobacter brockii*. Accession # P14941.1	2433
pCWori.trc-sadh5-aldh7.adh2	Cb	ColE1	P_{Trc}, double P_{Tac}	SADH5 is from *Clostridium beijerinckii*. Accession # AAA23199.2	2434
pCWori.trc-sadh6-aldh7.adh2	Cb	ColE1	P_{Trc}, double P_{Tac}	SADH6 is from *Kluyveromyces lactis* NRRL Y-1140. Accession # XP_455102.1	2435
pCWori.trc-sadh7-aldh7.adh2	Cb	ColE1	P_{Trc}, double P_{Tac}	SADH7 is from *Phytomonas* sp. ADU-2003 . Accession # AAP39869.1	2436
pCWori.trc-sadh8-aldh7.adh2	Cb	ColE1	P_{Trc}, double P_{Tac}	SADH8 is from *Ralstonia eutropha* H16 . Accession # Q0KDL6.1	2437
pCWori.trc-sadh9-aldh7.adh2	Cb	ColE1	P_{Trc}, double P_{Tac}	SADH9 is from *Trichomonas vaginalis* G3. Accession # XP_001580601.1	2438

pCWori.trc-sadh10-aldh7.adh2	Cb	ColE1	P_{Trc}, double P_{Tac}	SADH10 is from *Pseudomonas fluorescens*. Accession # AJP52792.1	2439
pCWori.trc-sadh11-aldh7.adh2	Cb	ColE1	P_{Trc}, double P_{Tac}	SADH11 is *from Lactococcus lactis*. Accession # WP_011835462.1	2440
pCWori.trc-sadh12-aldh7.adh2	Cb	ColE1	P_{Trc}, double P_{Tac}	SADH12 is from *Saccharomyces cerevisiae*. Accession # AAC04974.1	2441
pCWori.trc-sadh13-aldh7.adh2	Cb	ColE1	P_{Trc}, double P_{Tac}	SADH13 is *from Escherichia coli*. Accession # WP_000374004.1	2442
pCWori.trc-sadh14-aldh7.adh2	Cb	ColE1	P_{Trc}, double P_{Tac}	SADH14 is from *Zygoascus ofunaensis*. Accession # BAD32689.1	2443
pCWori.trc-sadh15-2-aldh7.adh2	Cb	ColE1	P_{Trc}, double P_{Tac}	SADH15 is from *Candida parapsilosis*. Accession # BAA24528.1	2444
pCWori.trc-sadh16-aldh7.adh2	Cb	ColE1	P_{Trc}, double P_{Tac}	SADH16 is from *Cyberlindnera jadinii*. Accession # BAN45671.1	2445

C. Oligonucleotide sequences. For primers used to introduce guide sequences for genome mutation, the guide sequence is in red.

Name	Sequence
adhE2 F6	gatatacatatggcaagctggagccacccgcagttcgaaaagggtgcaggtatgaaagtcacgaaccagaaggaactgaagcagaaactgaacgaactgc
adhE2 R1	atcaagcttggtaccttaaaaagatttgatataaatgtctttcagctcagagatcagcgggtaacgcggg
adhE2 R9	cgcgatacccgccggcacgtggtgcatagcacccag
adhE2 F9	cacgtgccggcgggtatcgcgtgtgctgtcctgatcgaagaagtaattaagtacaacgc
adhE2 R11	gtgagccatagacgcgcacacgcccaggaacgcgttgg
adhE2 F11	cctgggcgtgtgcgcgtctatggctcacaaactgggtgctatgcaccacgtgcc
adhE2 AADH R1	atcaagcttggtaccttagttttcacggcgttctgcaacagatttgatgttcagcagatgc
trc.crt delete GO1	caagcttgcatgcctgcaggtcgactctagattagcccatgtgcaggccaccgttcaggg
trc.crt delete GO2	gaacggtggcctgcacatgggctaatctagagtcgacctgcaggcatgcaagcttggctg
phaA GF1	taacaatttcacacagagctcaaggagatatacatatgactgatgttgtgattgtaagcg
phaA GR1	aaaacagccaagcttgcatgcctgcaggtcgactctagattatttgcgttcgacagccag
Clo DF13-cop3 QCF1	gatttggttgctgtgctctgcgaaaaccagttaccacggttaagcagttcc
Clo DF13-cop3 QCR1	ggaactgcttaaccgtggtaactggttttcgcagagcacagcaaccaaatc
aadA CloDF F1	gatacaaagcttttatttgccgactaccttggtgatctcg
aadA CloDF R1	gatacacctgagggatcaaaggatcttcttgagatccttttttttctgcg
ter delete GO5	agcggataacaatttcacacaggaaacaggatccgaattcaaaaaaggaggtaaaaaatg
ter delete GO6	catttttacctccttttttgaattcggatcctgtttcctgtgtgaaattgttatccgct
aldh46 GF3	tgagggtattaactacgaggc
aldh46.ADH GR1	actttgaaccacagcattaggacctcctctggtaagctctagattagccggccagaacac
aldh46.ADH GF1	gttctggccggctaatctagagcttaccagaggaggtcctaatgctgtggttcaaagtcc
ADH GR1	catgtttgacagcttatcatcgataagcttttaaaaagatttgatataaatgtctttcag
aldh GF1	ttgtgagcggataacaatttcacacaggaaacaggaattcaaaaaaggaggtaaaaaatg
aldh3 GF2	cggataacaatttcacacaggaaacaggaattcaaaaaaggaggtaaaaaatgattaagg
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(aldh3).adh2 GGF1	gatacaggtctcctccagaggaggaacagatggtcaacttttcctactgcaa
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adh16 GGF1	gatacaggtctcgtctagaaagagtaataag
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aldh6.(adh) GGR1	gatacaggtctcttagattaacgaatgctaaaggcgtcc
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aldh46.(adh) GGR1	gatacaggtctcttagattagccggccagaacacaac
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rrnB-1 GR1	gttccctactctcgcatgggctgaccccacactaccatcg
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sadh5 GF1	cacacaggaaacaggatccatcgatgcttaggaggtcatatgaaaggcttcgctatgctg
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sadh9 GF1	tttcacacaggaaacaggatccatcgatgcttaggaggtcatatgaccttcgaactgccg
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sadh10 GF1	ttcacacaggaaacaggatccatcgatgcttaggaggtcatatgatggcgaccatgaaag
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sadh11 GF1	ttcacacaggaaacaggatccatcgatgcttaggaggtcatatgtctaaagtggctgccg
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sadh15 GF1	tttcacacaggaaacaggatccatcgatgcttaggaggtcatatgagcattccgtccagc
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sadh16 GF1	ttcacacaggaaacaggatccatcgatgcttaggaggtcatatgctgcgcactaatctgc
sadh16 GR1	aatcttctctcatccgccaaaacagccctcgagttatttggtagtatccacgacgtaacg

.03 HBD QF1	cgactacgggtaattcggaac
.03 HBD QR1-1	atcaacaaattcatccttaatgtcg
.03 HBD QR1-2	gtttttgttaatgaagtccaggc
.03 HBD QR1	cgactgtcgttccgaattacc
.03 HBD QF1-1	ggttgccgtatcctggtgacg
.03 HBD QF1-2	gccacccaatcggtgcttctg
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pTT QR1	ccaccgaacttaccaacagc
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pTT QF3	agctggcacgacaggtttcc
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.3 crt QR1-1	gatttcgccaataacgtagtcc
.3 crt QR1-2	gcacttcgctgtcgttctcg
.3 crt QR1	gtcttgtgtgcagcctctcg
.3 crt QF1-1	tcgctcaaggcgcactcccg
.3 crt QF1-2	gtaaatcactgcataattcgtgtcg
CmR QF1	ggggcgaagaagttgtcc
CmR QR1	atattcgcaagatgtggcg
CmR QF2	ttgccatacggaattccg
CmR QR2	gaggcatttcagtcagttgc

D. Gene sequences of dehydrogenases

D1. AdhE2 variants in the pCDF3-TdTer.AdhE2.1-96 plasmids

AdhE2.1 (76930)

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   1  ATGAAAGTGA CGAACCAAAA AGAACTGAAA CAAAAACTGA ATGAACTGCG TGAGGCCCAG
  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
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 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.2 (76931)

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 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGGTA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
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 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
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1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.3 (76932)

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  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGGGTAAAAC CTACGACAAT
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 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
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1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
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1261  ACCTGGGAGG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.4 (76933)

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   1  ATGAAAGTGA CGAACCAAAA AGAACTGAAA CAAAAACTGA ATGAACTGCG TGAGGCCCAG
  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGGCGACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGCG GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGCGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.5 (76934)

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   1  ATGAAAGTGA CGAACCAAAA AGAACTGAAA CAAAAACTGA ATGAACTGCG TGAGGCCCAG
  61  AAAAAGTTCG CTTGCTATAC CCAGGACCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC GAGCTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
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 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.7 (76936)

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  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGT TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGAGAT GAAAACCTCT CGCTTCTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
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1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.8 (76937)

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  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGCGGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGGAGGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGCTGG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.9 (76938)

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   1  ATGAAAGTGA CGAACCAAAA AGAACTGAAA CAAAAACTGA ATGAACTGCG TGAGGCCCAG
  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
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 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAATACA CCAAAATCTT GATCGGCGAA
 961  GTGCAGCACG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCCCG
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.10 (76939)

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  61  AAAAAGTTCC TGACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGC TGCTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTAACCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
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1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.11 (76940)

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   1  ATGAAAGTGA CGAACCAAAA AGAACTGAAA CAAAAACTGA ATGAACTGCG TGAGGCCCAG
  61  AAAAAGTTCG CTACGTATAC CCAGGACCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG ACCCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGCAGGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
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2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.12 (76941)

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  61  AAAAAGTTCG CTAGCTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGAGCATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGGGTAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
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AdhE2.13 (76942)

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 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
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 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATCGTGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCAAAGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
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AdhE2.14 (76943)

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  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
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 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT AGCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGAGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
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1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.15 (76944)

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  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGT TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AATACCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAAGAG
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
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2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.16 (76945)

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   1  ATGAAAGTGA CGAACCAAAA AGAACTGAAA CAAAAACTGA ATGAACTGCG TGAGGCCCAG
  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGAGAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AACCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCAAAGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.17 (76946)

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  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AACTGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
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 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCGAGGAGC TGCTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.18 (76947)

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  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACCACA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGGCGACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGGACAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
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1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.19 (76948)

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 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAAGAG
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCGTT
1321  TCGGTCGCGC GTCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.20 (76949)

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 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGCG GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGGACG TGGAGAAGAG CGAACTGTTC AGCGTTGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.21 (76950)

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  61  AAAAAGTTCG CTACGTATAC CCAGGACCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAAAG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAAAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
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 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.22 (76951)

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   1  ATGAAAGTGA CGAACCAAAA AGAACTGAAA CAAAAACTGA ATGAACTGCG TGAGGCCCAG
  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGT TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC CGTCTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGGCGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
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1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.23 (76952)

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  61  AAAAAGTTCG CTACGTGCAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCGCGAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATCGTGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
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AdhE2.24 (76953)

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  61  AAAAAGTTCA ACACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
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 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCGCGAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTGAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.25 (76954)

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  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AACTGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG ACCCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGCTGG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
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1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.26 (76955)

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  61  AAAAAGTTCC TGACGATGAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTCACCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
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2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.27 (76956)

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   1  ATGAAAGTGA CGAACCAAAA AGAACTGAAA CAAAAACTGA ATGAACTGCG TGAGGCCCAG
  61  AAAAAGTTCG CTTGCTATAC CCAGGAGCAA GTTGAGAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCC ACCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.28 (76957)

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  61  AAAAAGTTCG CTACGTGCAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
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 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAATTCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGCGTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.29 (76958)

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  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACCACA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AACCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTAACCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
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1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
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AdhE2.30 (76959)

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 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAAGAG
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  ATGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
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1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
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AdhE2.31 (76960)

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 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
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 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGGAGGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
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1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.32 (76961)

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   1  ATGAAAGTGA CGAACCAAAA AGAACTGAAA CAAAAACTGA ATGAACTGCG TGAGGCCCAG
  61  AAAAAGTTCG CTACGATGAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  ATGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
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 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT AGCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.33 (76962)

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   1  ATGAAAGTGA CGAACCAAAA AGAACTGAAA CAAAAACTGA ATGAACTGCG TGAGGCCCAG
  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGAGCATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAATTCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGCGTAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
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1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.34 (76963)

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  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCGAGGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT ATCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCGTT
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.35 (76964)

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  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
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 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAAAG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGAAAGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCC ACCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.36 (76965)

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  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
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 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACCACA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAAAG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
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1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.37 (76966)

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  61  AAAAAGTTCG CTACGTATAC CCAGGCGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGGACG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCCCG
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
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2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.38 (76967)

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  61  AAAAAGTTCG CTACGATGAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGCAGGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGAGG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.39 (76968)

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  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG ACCCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
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 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTGAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT ATCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.40 (76969)

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   61  AAAAAGTTCG CTACGTATAC CCAGGCGCAA GTTGAGAAGA TCTTCAAACA GTGTGCCATT
  121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
  181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
  241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
  301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
  361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
  421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
  481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
  541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
  601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
  661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
  721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
  781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
  841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
  901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
  961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
 1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
 1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
 1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
 1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGCGTGCGGT
 1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
 1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
 1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
 1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
 1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
 1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
 1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
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1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
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AdhE2.41 (76970)

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 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGAGCATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AACCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
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 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.42 (76971)

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 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGGCGACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  AACGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGCGTAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.43 (76972)

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   1  ATGAAAGTGA CGAACCAAAA AGAACTGAAA CAAAAACTGA ATGAACTGCG TGAGGCCCAG
  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC CGTCTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAAAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
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1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCTTCTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.44 (76973)

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   1  ATGAAAGTGA CGAACCAAAA AGAACTGAAA CAAAAACTGA ATGAACTGCG TGAGGCCCAG
  61  AAAAAGTTCA ACACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGCACG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGC GTCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
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2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.45 (76974)

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   1  ATGAAAGTGA CGAACCAAAA AGAACTGAAA CAAAAAGACA ATGAACTGCG TGAGGCCCAG
  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  ATGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGCGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.46 (76975)

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   1  ATGAAAGTGA CGAACCAAAA AGAACTGAAA CAAAAACTGA ATGAACTGCG TGAGGCCCAG
  61  AAAAAGTTCG CTACGTATAC CCAGGCGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AATACCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
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 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTCACCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.47 (76976)

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  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGGTA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGCGGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGGACAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
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1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.48 (76977)

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   1  ATGAAAGTGA CGAACCAAAA AGAACTGAAA CAAAAACTGA ATGAACTGCG TGAGGCCCAG
  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AACTGCGTAT TAACTTGGCC GAGCTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCGTTGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
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2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.49 (76978)

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  61  AAAAAGTTCG CTACGTGCAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGGTA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGGCGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.50 (76979)

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  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC GAGCTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
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 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTGAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCGTT
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.51 (76980)

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  61  AAAAAGTTCG CTACGTATAC CCAGGCGCAA GTTGACAAGT TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGGAGGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAATTCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
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1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.52 (76981)

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  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGAGAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGCAGGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGGACG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGAGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.53 (76982)

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  61  AAAAAGTTCA ACACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AATACCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGCGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCCCG
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.54 (76983)

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   1  ATGAAAGTGA CGAACCAAAA AGAACTGAAA CAAAAACTGA ATGAACTGCG TGAGGCCCAG
  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGCG GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGCAGGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCGAGGAGA AACTGAGCCC GGTTCTGGCT
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1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGC GTCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.55 (76984)

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  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG ACCCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGCGGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCAAAGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTAACCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
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2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.56 (76985)

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  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATCGTGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAATTCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGGACG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGC GTCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.57 (76986)

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 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
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 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  AACGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATCGTGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCGTTGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.58 (76987)

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  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
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 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGAGCATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  ATGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAAAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCC ACCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
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1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.59 (76988)

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   1  ATGAAAGTGA CGAACCAAAA AGAACTGAAA CAAAAACTGA ATGAACTGCG TGAGGCCCAG
  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCGCGAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGGCGAG CGAACTGTTC AGCAAAGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGCTGG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
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2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.60 (76989)

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  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGGCGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTAACCTG
1081  GGCGGCAGCC ACCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCGTT
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
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AdhE2.61 (76990)

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 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGAAAGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
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 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAATACA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCTTCTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
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AdhE2.62 (76991)

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 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAATACA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCGTTGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGCTGG CTCAGCGTCT GATTCACCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
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1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
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1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
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1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
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1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
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AdhE2.63 (76992)

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 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAAGAG
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
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 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGGACAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGCGTAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
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1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.64 (76993)

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 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
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 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
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2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
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 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
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2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
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AdhE2.66 (76995)

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AdhE2.69 (76998)

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1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.70 (76999)

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   1  ATGAAAGTGA CGAACCAAAA AGAACTGAAA CAAAAACTGA ATGAACTGCG TGAGGCCCAG
  61  AAAAAGTTCC TGACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGGCGACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGGGTAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGCGTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
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2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
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AdhE2.71 (77000)

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 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACCACA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  AACGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCTTCTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCCCG
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.72 (77001)

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 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AACCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGCG GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
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 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGGAGGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT AGCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.73 (77002)

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 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC CGTCTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGGTA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGAGG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
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1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.74 (77003)

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  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
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 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGCGGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCGAGGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTCACCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.75 (77004)

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   1  ATGAAAGTGA CGAACCAAAA AGAACTGAAA CAAAAACTGA ATGAACTGCG TGAGGCCCAG
  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
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 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  ATGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCGAGGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGGACAAAG CTCAGCGTCT GATTAACCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGCGTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.76 (77005)

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   1  ATGAAAGTGA CGAACCAAAA AGAACTGAAA CAAAAACTGA ATGAACTGCG TGAGGCCCAG
  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGGTA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG ACCCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGCGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGCACG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTCACCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
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1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.77 (77006)

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   1  ATGAAAGTGA CGAACCAAAA AGAACTGAAA CAAAAACTGA ATGAACTGCG TGAGGCCCAG
  61  AAAAAGTTCG CTACGATGAC CCAGGAGCAA GTTGAGAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AACTGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAAAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAATACA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
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2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.78 (77007)

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  61  AAAAAGTTCG CTTGCATGAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGAAAGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGCTGG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT ATCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.79 (77008)

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   1  ATGAAAGTGA CGAACCAAAA AGAACTGAAA CAAAAACTGA ATGAACTGCG TGAGGCCCAG
  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
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 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGCAGGCGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAATACA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTGAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT AGCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.80 (77009)

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  61  AAAAAGTTCG CTACGTATAC CCAGGCGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGCG GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  AACGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAAAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGCACG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
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1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.81 (77010)

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   1  ATGAAAGTGA CGAACCAAAA AGAACTGAAA CAAAAACTGA ATGAACTGCG TGAGGCCCAG
  61  AAAAAGTTCG CTAGCTATAC CCAGGCGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACCACA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCGTTGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGCGTAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
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2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.82 (77011)

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  61  AAAAAGTTCG CTACGTATAC CCAGGACCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  AACGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGGCGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT ATCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGAGG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.83 (77012)

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  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG ACCCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGGGTAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
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 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGC TGCTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCC ACCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGAGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.84 (77013)

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   1  ATGAAAGTGA CGAACCAAAA AGAACTGAAA CAAAAACTGA ATGAACTGCG TGAGGCCCAG
  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGAGAAGT TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGAGCATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCCCG
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGC GTCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
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1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.85 (77014)

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  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGCAGGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCAAAGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCC ACCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGCGTAT GAAAACCTCT CGCTTCTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.86 (77015)

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   1  ATGAAAGTGA CGAACCAAAA AGAACTGAAA CAAAAACTGA ATGAACTGCG TGAGGCCCAG
  61  AAAAAGTTCA ACACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
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 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAAAG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAATTCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTAACCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT AGCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.87 (77016)

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   1  ATGAAAGTGA CGAACCAAAA AGAACTGAAA CAAAAAGACA ATGAACTGCG TGAGGCCCAG
  61  AAAAAGTTCG CTACGTGCAC CCAGGACCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGGGTAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCAAAGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
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1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.88 (77017)

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  61  AAAAAGTTCA ACACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAAGAG
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGAGCATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGGCGACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGGAGGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
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2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.89 (77018)

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 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC GAGCTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAAGAG
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAATTCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGAGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
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AdhE2.90 (77019)

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 121  GCGGCTGCCA AACTGCGTAT TAACTTGGCC CGTCTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
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 541  ATGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCGCGAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCGTT
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.91 (77020)

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  61  AAAAAGTTCG CTACGTGCAC CCAGGAGCAA GTTGACAAGT TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGGCGACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGGACG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGCTGG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
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1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.92 (77021)

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   1  ATGAAAGTGA CGAACCAAAA AGAACTGAAA CAAAAACTGA ATGAACTGCG TGAGGCCCAG
  61  AAAAAGTTCC TGACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAAAG AACCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGGACG TGGAGGCGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.93 (77022)

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  61  AAAAAGTTCC TGTGCTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACCACA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGCGGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATCGTGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
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AdhE2.94 (77023)

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 121  GCGGCTGCCA AATACCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AACCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
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 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCGTTGAGC TGCTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTGAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.95 (77024)

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  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AATACCGTAT TAACTTGGCC AAACTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGAAA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGCCTGC TATCGGCGTT GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCAAAAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGGAGGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATCGTGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGGACAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCTTCTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
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1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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AdhE2.96 (77025)

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  61  AAAAAGTTCG CTACGTATAC CCAGGAGCAA GTTGACAAGA TCTTCAAACA GTGTGCCATT
 121  GCGGCTGCCA AAGAGCGTAT TAACTTGGCC GAGCTGGCGG TGGAAGAAAC CGGCATCGGT
 181  CTGGTCGAGG ACAAGATTAT CAAGAATCAC TTTGCCGCGG AGTATATCTA CAACAAATAC
 241  AAAAACGGTA AGACTTGCGG CATCATTGAT CATGATGACA GCTTGGGTAT CACGAAAGTC
 301  GCAGAACCAA TCGGTATTGT CGCGGCAATT GTCCCGACCA CTAATCCGAC CAGCACCGCG
 361  ATCTTCAAGA GCTTGATCAG CCTGAAAACC CGCAACGCGA TTTTCTTCAG CCCGCACCCG
 421  CGTGCGAAGA AGAGCACCAT CGCAGCGGCG AAGCTGATTT TGGATGCCGC GGTTAAGGCC
 481  GGTGCACCGA AAAACATTAT TGGCTGGATT GACGAGCCGA GCATTGAGCT GTCTCAGGAC
 541  CTGATGAGCG AAGCGGACAT TATTCTGGCC ACCGGTGGTC CGTCTATGGT TAAGGCAGCG
 601  TACTCCAGCG GTAAGAAAGC TATCGGCGCG GGTGCGGGCA ATACGCCGGC TATCATCGAT
 661  GAAAGCGCGG ATATTGATAT GGCAGTTAGC TCCATCATTC TGTCCGCGAC CTACGACAAT
 721  GGTGTTATCT GTGCAAGCGA GCAAAGCATC CTGGTGATGA ATAGCATTTA CGAGAAGGTC
 781  AAAGAAGAGT TTGTTAAGCG TGGTTCCTAT ATTCTGAACC AGAACGAGAT TGCAAAAATC
 841  AAAGAAACGA TGTTTAAGAA TGGCGCGATT AATGCAGATA TTGTTGGTAA GTCCGCATAC
 901  ATTATCGCGA AGATGGCGGG TATCGAAGTG CCGCAAACCA CCAAAATCTT GATCGGCGAA
 961  GTGCAGAGCG TGGAGAAGAG CGAACTGTTC AGCCATGAGA AACTGAGCCC GGTTCTGGCT
1021  ATGTACAAAG TGAAGGACTT TGACGAAGCC CTGAAGAAAG CTCAGCGTCT GATTGAGCTG
1081  GGCGGCAGCG GTCACACGAG CAGCCTGTAT ATCGATAGCC AAAACAATAA GGACAAGGTG
1141  AAAGAGTTCG GTCTGGCGAT GAAAACCTCT CGCACGTTTA TCAACATGCC GAGCAGCCAA
1201  GGTGCGAGCG GCGATCTGTA TAACTTCGCA ATCGCGCCTT CTTTTACGCT GGGTTGCGGT
1261  ACCTGGGGCG GTAATTCGGT GAGCCAGAAT GTCGAGCCGA AGCACCTGCT GAACATCAAA
1321  TCGGTCGCGG AGCGCCGTGA GAAGAGACCG TGGTTCAAAG TCCCACAGAA AATTTACTTC
1381  AAATACGGCT GCCTGCGTTT CGCGCTGAAA GAACTGAAAG ACATGAACAA AAAGCGTGCG
1441  TTCATTGTTA CCGACAAAGA CCTGTTCAAA CTGGGTTACG TGAACAAAAT CACCAAAGTT
1501  CTGGATGAAA TTGACATCAA GTACTCCATC TTCACTGATA TCAAATCCGA CCCAACGATT
1561  GATAGCGTGA AAAAGGGCGC TAAAGAAATG CTGAACTTTG AACCGGACAC CATCATCAGC
1621  ATCGGTGGTG GCTCTCCTAT GGATGCTGCG AAGGTCATGC ACCTGCTGTA CGAATACCCG
1681  GAAGCGGAAA TCGAAAACCT GGCTATCAAC TTCATGGACA TCCGCAAACG TATCTGCAAC
1741  TTCCCGAAGC TGGGCACTAA AGCTATTTCC GTTGCCATCC CGACTACCGC GGGCACTGGT
1801  TCCGAAGCCA CGCCGTTCGC CGTGATCACC AACGATGAAA CCGGTATGAA ATACCCGCTG
1861  ACCTCTTACG AACTGACCCC GAACATGGCA ATTATCGACA CCGAGCTGAT GCTGAACATG
1921  CCGCGCAAGC TGACCGCTGC TACCGGCATC GACGCTCTGG TACATGCTAT TGAGGCGTAC
1981  GTTTCCGTGA TGGCTACCGA TTACACCGAC GAACTGGCCC TGCGTGCGAT CAAAATGATT
2041  TTCAAGTACC TGCCTCGCGC TTACAAAAAC GGCACGAATG ACATCGAGGC GCGTGAGAAA
2101  ATGGCCCATG CAAGCAACAT CGCGGGCATG GCCTTCGCCA ACGCGTTCCT GGGCGTGTGC
2161  CACTCTATGG CTCACAAACT GGGTGCTATG CACCACGTGC CGCACGGTAT CGCGTGTGCT
2221  GTCCTGATCG AAGAAGTAAT TAAGTACAAC GCTACTGATT GCCCGACTAA ACAGACCGCC
2281  TTCCCACAGT ACAAATCTCC TAACGCTAAA CGTAAGTACG CTGAGATCGC CGAATACCTG
2341  AACCTGAAGG GTACGAGCGA CACTGAGAAA GTTACTGCGC TGATCGAAGC TATCTCTAAA
2401  CTGAAAATTG ACCTGTCCAT CCCGCAGAAC ATCAGCGCCG CAGGCATCAA CAAAAAGGAC
2461  TTTTACAACA CGCTGGACAA AATGAGCGAA CTGGCTTTTG ACGACCAGTG CACCACTGCA
2521  AACCCGCGTT ACCCGCTGAT CTCTGAGCTG AAAGACATTT ATATCAAATC TTTTTAA
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D2. AdhE2 homologs in the pCDF3-TdTer.AdhE29-45 plasmids

Name	Accession No.
AdhE30	317057809
AdhE31	221194444
AdhE32	302875249
AdhE33	149276422
AdhE34	15004865
AdhE35	260891427
AdhE36	126697906
AdhE37	188590416
AdhE38	300854834
AdhE39	110802422
AdhE40	210633271
AdhE41	220930559
AdhE42	168184834
AdhE43	317133832
AdhE44	307687897
AdhE45	225571592

D3. Monofunctional ALDH variants in the pCDF3-TdTer.ALDH1-15 and ALDH46 plasmids

ALDH1

ATGAATAAAG ACACCCTGAT TCCAACTACC AAAGATCTGA AGCTGAAAAC TAATGTCGAA
AACATCAATT TGAAGAACTA CAAAGATAAC AGCTCGTGTT TTGGCGTGTT CGAAAACGTT
GAGAACGCGA TCAATTCCGC CGTTCACGCA CAGAAGATTC TGAGCCTGCA CTACACCAAA
GAGCAGCGTG AGAAGATCAT TACGGAAATC CGCAAAGCGG CGCTGGAGAA TAAAGAGGTG
CTGGCTACCA TGATTCTGGA AGAAACCCAC ATGGGTCGTT ATGAGGACAA AATCCTGAAG
CACGAGCTGG TCGCTAAGTA CACCCCTGGC ACCGAGGACC TGACGACCAC GGCATGGAGC
GGTGATAACG GTTTGACGGT CGTCGAAATG AGCCCGTATG GCGTCATTGG TGCAATTACC
CCTAGCACCA ATCCGACCGA AACTGTGATC TGCAACTCTA TCGGTATGAT TGCTGCGGGC
AATGCCGTCG TTTTCAATGG CCATCCGGGT GCGAAGAAGT GCGTTGCGTT CGCTATTGAA
ATGATCAACA AGGCGATCAT CTCCTGTGGT GGTCCGGAGA ACTTGGTGAC CACGATCAAA
AATCCGACGA TGGAGAGCCT GGATGCGATC ATTAAACATC CGCTGATTAA ACTGTTGTGC
GGTACGGGCG GTCCGGGTAT GGTTAAAACG CTGCTGAATA GCGGCAAAAA GGCAATCGGT
GCCGGTGCGG GCAACCCGCC AGTTATCGTA GACGACACGG CGGACATTGA AAAGGCCGGT
AAGAGCATTA TTGAGGGTTG TTCTTTTGAC AACAATCTGC CGTGTATTGC GGAGAAAGAA
GTGTTTGTTT TCGAGAATGT GGCGGATGAC CTGATTAGCA ACATGCTGAA AAACAATGCA
GTTATCATCA ACGAGGATCA AGTCTCCAAG CTGATCGATC TGGTGTTGCA GAAAAACAAC
GAAACCCAAG AGTACTTCAT TAACAAGAAG TGGGTTGGTA AGGATGCAAA GCTGTTTAGC
GACGAGATTG ACGTGGAAAG CCCGAGCAAT ATCAAATGCA TCGTGTGCGA GGTCAATGCA
AATCACCCGT TCGTTATGAC CGAACTGATG ATGCCGATCC TGCCGATTGT TCGCGTGAAA
GATATCGATG AGGCGGTCAA ATACACTAAG ATCGCGGAGC AGAATCGTAA ACATAGCGCG
TACATCTATA GCAAGAACAT CGACAACTTG AATCGTTTCG AACGTGAGAT CGACACCACG
ATTTTTGTGA AAAACGCAAA GAGCTTCGCC GGTGTGGGCT ATGAAGCCGA AGGCTTTACC
ACCTTTACCA TTGCGGGCAG CACGGGCGAG GGTATTACCT CTGCACGTAA TTTCACCCGT
CAACGCCGCT GCGTTCTGGC CGGTTAA

ALDH2

ATGAATGACA TCGAAATCGC CCAAGCCGTA AGCACTATTC TGAGCAAGTT CACTAAAGCA

ACGCCTGACG AGGCTCCGGC GACCTCGGAA GCCGCACGTG TCGATGGTCT GGATGAGATT
GTGGCAAAAG CCTTGGCCCA GCACAGCAGC GTGCGCGATG CTTCTGCGAT TAGCCAAGTT
GCGAAAGTTG CCAACGCTTC TACCGGTGCG TTCGATACGA TGGACGAGGC GATCTCCGCA
GCGGTTTTGG CACAGGTCCA ATATCGTCAT TGTTCTATGC AGGATCGCGC AAGCTTTATC
AATGGTATTC GCGACGTGTT CCTGCAAGAG GACGTGCTGT GTGCCCTGAG CCGCATGGCG
GTGGAAGAAA CCGGTATGGG TAACTACGAA GATAAGCTGA TCAAAAATCG CGTGGCCGCA
CTGAAAACGC CGGGTATTGA GGATCTGACG ACCAGCGCGG TTAGCGGCGA CGGTGGCCTG
ACGCTGATTG AATACAGCGC GTTCGGCGTC ATTGGCAGCA TCACCCCAAC CACGAACCCG
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AGCCCGCACC CGCGTTCCCG CAAGGTTTCC CTGTACGCGG TGGAATTGAT CAACAATAAA
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AACACCAATG TTCTGATTAA TGATCCGCGT ATTAACATGC TGGTAGCAAC CGGCGGTCCG
GCGATTGTTA AGACCGTTAT GAGCAGCGGT AAAAAGGCGA TCGGTGCGGG TGCTGGTAAC
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GGTTGCAGCT TCGACAACAA TCTGCCATGT GTCGCAGAAA AAGAGGTCAT CGTTGTCAAT
CAGGTTGCTG ATTACCTGAT CCATTGCATG AAGAAAAGCG GTGCCTATCT GCTGTGCGAC
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GACGACATTA AGGTCATTTT GATCGAAGCG GAGAAAACCC ACCCGTTTGT TGTTCACGAG
CTGATGATGC CGGTCTTGCC GGTTGTGCGT GTGGACAATG TGGATGAGGC GATTGAGCTG
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AAGTTGACCA AGATGGCGCG TCTGATTCAA ACGACCATCT TTGTCAAAAA TGGTCCGTCG
TATGCGGGCC TGGGCGTTGG TGGTGAGGGT CATGCGACCT TTACCATTGC TGGCCCGACG
GGTGAAGGTC TGACCAGCGC CCGTAGCTTC GCACGTCGTC GTCGTTGCGT GATGGTCGAG
GCGCTGAACA TTCGCTAA

ALDH3

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GAGAATGCTA TTAGCAATGC GGTGCATGCG CAGAAAATCC TGTCCCTGCA TTACACCAAA
GAGCAACGCG AAAAGATCAT CACTGAGATT CGTAAGGCCG CACTGGAGAA TAAAGAGATC
CTGGCGACCA TGATTCTGGA AGAAACCCAC ATGGGTCGTT ACGAGGATAA GATTCTGAAG
CACGAATTGG TTGCCAAGTA CACTCCGGGT ACCGAAGATC TGACCACCAC GGCGTGGAGC
GGTGATAACG GTCTGACCGT TGTCGAGATG AGCCCGTATG GTGTTATCGG TGCCATTACC
CCTTCTACGA ATCCGACGGA AACCGTGATC TGCAACAGCA TCGGCATGAT TGCGGCAGGC
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CAGCGTCGTT GTGTTCTGGC GGGTTAA

ALDH4

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CGCGAAGAAA CCAAGCTGGG CCGTGTCGAG GATAAGATCG CGAAACATCA ACTGACCGCA
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ALDH5

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ALDH6

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ALDH7

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ALDH8

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ALDH9

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ACCTTCACTC GCAAACGTCG TTGCGTTATG GTTGACAACT TTTCTATTAA GTAA

ALDH10

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ALDH11

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ALDH12

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ALDH13

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ALDH14

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GGTTTTAGCA TTAAATAA

ALDH15

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ALDH46

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ATTTTTGTGA AAAACGCAAA AAGCTTTGCG GGTGTGGGCT ATGAGGCGGA AGGCTTCACC
ACCTTTACCA TTGCAGGTTC TACCGGTGAA GGTATCACGA GCGCCCGTAA CTTCACGCGC
CAACGTCGTT GTGTTCTGGC CGGCTAA

E. gBlock sequences for ADH screening

E1. Primary ADHs

aldh46.x G1

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GTGTGGGCTA TGAGGCGGAA GGCTTCACCA CCTTTACCAT TGCAGGTTCT ACCGGTGAAG
GTATCACGAG CGCCCGTAAC TTCACGCGCC AACGTCGTTG TGTTCTGGCC GGCTAATCTA
GATGAACAAC TTCCGTTTCT GCACCCTACC GAATTACTAG TATCGATGAT AAGCTGTCAA
ACATGAGCAG ATCTGAGCCC GCCTAATGAG C
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ADH1 G1 (Accession No. B6YQP9_AZOPC)

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GAATTCATTT TTGGTAAAAA CACCATCTGT AAAGTGGCTC AGCTGGTTAA ACAGTATGGT
GGCTCTAAAG TTCTGATCCA TTACGGCAAT AAATCTGCGA AAAAATCTGG TCTGCTGACC
CAGATCGAGA ACTGCTTCCA GAACGAATTT ATCGAATATG TCAAACTGGG TGGTGTTCAG
CCGAACCCGA TCGACGAACT GGTCTACAAG GGTATCGAAC TGGGCCGTAA AGAAAAAGTT
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GCCCTGCCAA TTGCAACTGT TCTGACCCTG CCTGCTGCGG GCTCTGAGGG TTCTCCGAAC
ACTGTCATCA CGAAAACCGA CGGTATGCTG AAACGTGGCA TCGGTTCTTC CTTCATCCGC
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ADH1 G2 (Accession No. B6YQP9_AZOPC)

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ATCCACAGCG CGAAAACTCT GATTCGCGAA CCGGAAAACT ACGACGCTCG TGCCAACATC
ATGTGGGCCT CCACGATCGC GCACAACGGT ATCTGCGGCG TGGGTCGTGA AGAAGACTGG
GCGACCCATG CTCTGGAACA TGAACTGTCC GCGCTGTATA ACATCGCACA CGGCGCCGGC
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GAACAGCTGG GCGCACAGAA AAGCGATATT GACAAACTGA TTGACACCCT GAAAATTAAC
ACCAAAGGTA AACTGGGTAA CTTCCTGCTG CTGGACATGA ACGATGCTCG TGCAATCTAC
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GAGCCCGCCT AATGAGC
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ADH2 G1 (Accession No. A0RQF7_CAMFF)

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TTCGGCAAAG GTAAAGAAAA CTCCATCGGT GAATACCTGA ACGAATATGG CGCAAAAAAC
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GCGTCCCTGA CCAAATTCGG CATCAAATTC TCCGAACTGG GTGACATTGT GAGCAATCCA
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ACCAACGAAG ACACTAAAGA GAAAATCTCT ATCACCTCTT CCCTGGTGAA CCCAAAAGTA
AGCGTAATCA ATCCGGAACT GATGAAATCC ATTTCTAAAA ACTACCTGGT GTACTCCGCG
GCCGACATCA TCGCGCATTC TATCGAAGGC TACCTGACCG CAACTCATCA CCCGGAAATT
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ADH2 G2 (Accession No. A0RQF7_CAMFF)

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CGAACCACAT GATCGAACAT TCCATCTCTG CACTGTACGG TGTACCGCAT GGTGCGGGTC
TGTCCGTAGT AATGCCGGCA TGGATGAAAT GGTATAAGGA CAAAAATGAA GCCCAGTTCT
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CCGTATCTGA CATCACCACT GCTGCGCTGC ATCACGCTAA AGCATTTGGT ATCGCTGATA
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ADH3 G1 (Accession No. G5F136_9ACTN)

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CAAAGCGATG ATTCACTGGG GCGGTGACTA TGTTCGCGAT ACGGGTCTGC TGGACCGTGT
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TATCAACATC GATACGATGG GTGACGTCGA GCTGAAACGT AGCTACAACC ACGAATGTGC
CCGTCCGAAA TTCGCGATCA TGGATCCGGA ACTGACCTAT ACCGTTCCGG CATGGCAGAC
GGCCGCCGCT GGCTGCGACA TTATGATGCA CACTA

ADH3 G2 (Accession No. G5F136_9ACTN)

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TACGTATGAG CGAACTGGCA ATCAACCCGA CTGATGAGGA GATCCGTCAT ATGGCTCAGG
GCGCCATTGA CGCCCGTGGT GGTGATCATT GCGGTTCTTT CATGGAACTG CGTGTTGATG
ACGTCGTAAA AATTCTGGAA ATGGCCCGCT AAACTAGTAT CGATGATAAG CTGTCAAACA
TGAGCAGATC TGAGCCCGCC TAATGAGC

ADH4 G1 (Accession No. B1C7G7_9FIRM)

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GAAGGCTTAT ATCGTTTACG GCGGCAAATC CGCGAAAAAA AGCGGTCTGC TGGACAAAGT
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ADH4 G2 (Accession No. B1C7G7_9FIRM)

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GCTTCTACGT GAAAGGTACC AAAGTAGGTA AACTGATTCC GCTGACCGAA GAAGATATTT
ACCCGATCTA TGTATCTGCG AACAAATAAA CTAGTATCGA TGATAAGCTG TCAAACATGA
GCAGATCTGA GCCCGCCTAA TGAGC

ADH5 G1 (Accession No. YUGK_BACSU)

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CAAACTGATC TTCGGCAAAG GCCAGCTGGA ACAGCTGCGC AAAGAATTTA AACGTTATGG
TAAAAACGTT CTGCTGGTTT ATGGTGGCGG CTCCATCAAA CGCAACGGTC TGTACGACCA
GGTCACCGGC ATCCTGAAAG AGGAGGGCGC GGTGGTTCAC GAACTGAGCG GTGTTGAACC
GAACCCGCGC CTGGCTACCG TGGAAAAGGG CATTGGTCTG TGCCGTGAAC ACGATATCGA
TTTTCTGCTG GCCGTCGGTG GTGGCTCTGT CATTGACTGC ACCAAAGCAA TCGCGGCGGG
TGTAAAATAC GATGGTGACG CTTGGGATAT CTTTTCCAAA AAGGTTACCG CCGAAGACGC
TCTGCCGTTT GGCACCGTAC TGACCCTGGC CGCTACCGGT TCCGAGATGA ACCCGGATTC
CGTTATCACC AACTGGGAAA CTAACGAAAA ATTCGTCTGG GGTTCCAACG TTACCCACCC
GCGCTTCTCT ATCCTGGACC CGGAAAACAC CTTTACCGTA CCGGAAAACC AGACAGTGTA
TGGCATGGTT GACAT

ADH5 G2 (Accession No. YUGK_BACSU)

AAACACCTTT ACCGTACCGG AAAACCAGAC AGTGTATGGC ATGGTTGACA TGATGTCTCA
CGTTTTCGAA CAGTATTTCC ATAACGTAGA AAACACTCCG CTGCAGGATC GTATGTGCTT
TGCTGTGCTG CAGACCGTCA TCGAAACGGC TCCGAAGCTG CTGGAAGACC TGGAAAATTA
CGAACTGCGT GAAACCATTC TGTACGCGGG TACCATTGCG CTGAACGGTA CTCTGCAGAT
GGGTTACTTC GGTGATTGGG CGTCTCACAC TATGGAACAC GCAGTGAGCG CAGTGTACGA
CATTCCGCAC GCGGGCGGTC TGGCGATTCT GTTTCCGAAT TGGATGCGTT ACACGCTGGA
TACTAACGTG GGTCGTTTCA AAAACCTGAT GCTGAACATG TTCGATATCG ATACGGAAGG
CAAAACTGAC AAGGAGATCG CCCTGGAAGG TATTGACAAA CTGTCCGCAT TTTGGACGAG
CCTGGGCGCG CCGTCCCGTC TGGCCGATTA CAACATCGGC GAAGAAAAAC TGGAGCTGAT
CGCAGACATT GCTGCGAAAG AGATGGAGCA CGGCGGCTTC GGCAACTTTC AGAAGCTGAA
TAAAGACGAC GTACTGGCGA TCCTGCGTGC ATCTCTGTAA ACTAGTATCG ATGATAAGCT
GTCAAACATG AGCAGATCTG AGCCCGCCTA ATGAGC

ADH6 G1 (Accession No. A8SGI9_9FIRM)

CGAGCGCCCG TAACTTCACG CGCCAACGTC GTTGTGTTCT GGCCGGCTAA TCTAGACCTC
TCCCGGTACG ATAATAAGGA GGCATCAATG AACAACTTCC TGTTCGAAAA CAAAACCAAA
GTATACTTCG GTAAGGGTGG TGTTAAAGAA TATCTGGGTT GTCTGCTGGA ACATTATGGT
GACACCGTTA TGCTGGCCTA TGGCGGCGGC TCCATCAAAC ATAACGGTGT ATATGATGAA
ATTGTGGGCA TCCTGAACGC CGAAGGCAAA CGCATCGTTG AATTCCCGGG TATCATGCCG
AACCCGACGT ATGCTAAGGT GCAAGAAGGT GCTAAACTGG CGCGTGAAAA CCACGTAGAC
CTGATCCTGG CCGTTGGCGG TGGTAGCGTT TCCGACTGCT GCAAAGTTGT GAGCGCGCAG
GCAAAAGTAG ATGAAGATCT GTGGGAGCTG GAAAACACTA AACACACTCG CCCGACTGCA
TTCATTCCGC TGGGTACCAT TGTGACCGTT TTTGGTACTG GCAGCGAAAT GAACAACGGC
GCTGTAATCA CCCACGAGGA GAAAAAAATT AAAGGTGCTC TGTGGGGCGC ACAGGCGGAC
TTTGCATTCC TGGACCCGAC TTATACTCTG TCCGTGCCGA TGAAACAGGT TATTAGCGGT
GCGTTCGACA CTCTG

ADH6 G2 (Accession No. A8SGI9_9FIRM)

ACTCTGTCCG TGCCGATGAA ACAGGTTATT AGCGGTGCGT TCGACACTCT GAGCCACGCT
ATGGAAACTT ATTTCGGCAA ACCGGATGAG AACAATCTGT CCGACGACAT CAACGAAGCG
GTGATGCGTT CCGTTATCCG TAACATTCGT GTGCTGCTGA CCGACAAGGA TAACTACGAA
GCACGCTCCG AACTGACCTG GGCTTCTGCG ATGGCAGAAA ACGGTATTCT GAAAATCGGT
AAAGTAACTG ACTTTCAATG CCACATGATC GAACATCAGC TGGGCGCATA CACTAACTGT
AACCACGGCG CTGGTCTGGC GGTTATCCAC CCGGTTCTGT ATCGTCATCT GCTGCCGGCG
AACACCGCAC GTTTCGCGCG TTTCGCTCAA AACGTTTGGG GCATCGATCC AGCAGGTAAA
TCCGAACTGA AACTGGCGCA GGCGGGTGTG GAAGCTCTGG CGGCGTTTAT CAAGGAAATT
GGCATGCCGA CTACCTTCGC TGAGCTGGGC GTTCCGGCGG ACACCGATCT GAAAGCCGTA
GCTGACTCTA CCGTCCTGAC CGGTGGTTGT TGCAAAAAAC TGTCTCGTGA AGAGCTGCTG
GACATCCTGA ACGAATGTAA ATAAACTAGT ATCGATGATA AGCTGTCAAA CATGAGCAGA
TCTGAGCCCG CCTAATGAGC

ADH7 G1 (Accession No. E2SQ66_9FIRM)

CGAGCGCCCG TAACTTCACG CGCCAACGTC GTTGTGTTCT GGCCGGCTAA TCTAGATATC
CAGCCATTCC CCAGGAGAAA CCACTATGCG TAACTTTACC TACCACAACC CGGTCCGTAT
CCTGTTCGGC GATCATGCTC TGGACCAGCT GCCGGATCTG TTCCGTGAAT TCCACGTGTC
TAACCTGCTG CTGGTGTATT CTGGCGATTT TATTAAAGAA CTGGGCATCT GGGATGCCGT
TTACAACGCT TGCGCGGAAA ATGGTATCGC ATTTTACGAA GAAGGTGGTG TAGTCCCGAA
CCCGAAAATT GAACTGGTTC GTGAACTGGT CGCACTGGGC AAAAAAAAAA AGATCGACTT
CATTCTGGCT GTAGGCGGTG GTTCTTCCAT CGACACTGCT AAGGCTGTTG CCGCAGGCAT
CCCGTACGCC CACGACGTGT GGGACTTCTT CGAATACACT GCGGTTCCGG AAACGGCGGT
GCCGATCGGT GTAATCACCA CGATCCCAGC GTCTGGTTCC GAATGTTCTA ATTGCAGCAT
TATCTCCAAC GGTCTGCACA AATGCGGTAT TGAGTACGAT TGCATCATCC CACAGTTTGC
CATCATGAAC CCGGAGTACA CCCGTACCCT GCCTGCGTAC CAGACCTCCG CAGGCATCGC
GGACATTCTG TCCCA

ADH7 G2 (Accession No. E2SQ66_9FIRM)

GTACCCTGCC TGCGTACCAG ACCTCCGCAG GCATCGCGGA CATTCTGTCC CACATGCTGG
AACGCTACTT CACGAACACT ACTCACGTTG ACACCACCGA CTACATGCTG GAAGGTACCA
TGCAGGCTCT GATGGTCAAC GCGCGCCGCC TGATGAAACA GCCGGATGAC ATCCACGCGC
GCGCAGAAGT TCAGTGTCTG GCTTTCCTGG CACATAACAA CCTGCTGGAC ATCGGTCGCG
AATCTGACTG GGGCCCGCAT CGTATTGAAC ACGAACTGTC CGCACAGTAC GGCATTACCC
ACGGTGAAGG TATGGCAGTT GTAACCATCG CGTGGGCACG CTACATGGCT GCACACCACC
CGGACAAACT GGCACAGCTG GCCTCCCGTA TCTTCGGTGC TGATCCGTTT GTACATTCCA
AAGAGGATAT GGCACTGCTG CTGGCTGACC ACCTGGAAGA GTTTTTCAAA TCCCTGCACC
TGAAAACCAC CCTGCACGAA ATGGGTATCG ACGATACCCA CTTTGAAGAG ATGGCAAACC
GTGCCACCAA TAACGGTAAG GATTGTGTTG GCCACTACGT GGCTCTGAAC AAACAGATCT
TTATCGACAT TCTGCACATG GCCCTGTAAA CTAGTATCGA TGATAAGCTG TCAAACATGA
GCAGATCTGA GCCCGCCTAA TGAGC

ADH8 G1 (Accession No. E1QYZ8_OLSUV)

CGAGCGCCCG TAACTTCACG CGCCAACGTC GTTGTGTTCT GGCCGGCTAA TCTAGAGACT
TAGTAGTCAC ACGCAAGAGG AGGATTCCAG TATGTACGAC TTCATGTTCC ACGTACCGAC
CAAGATCTAC TTCGGCCGCG GCCAGATCTC TCACCTGGCA GAACTGTCTG ATTTTGGCCA
GAAAGCGCTG CTGGTTTACG GTGGCGGCAG CATCAAACGT AACGGCATTT ACGACGAAGC
GATTCGTATT CTGACCCATG CGGGTATCGA AGTTGTAGAA CTGAGCGGCG TTGAACCGAA
CCCGCGTATT GAAACCGTGC GTCGCGGTGT CGGTCTGTGC GCTCGCGAAG GTGTTGACAT
GGTTCTGGCT ATCGGCGGCG GTAGCACCAT CGATTGCGCT AAAGTAGTTG CGGCCGGCGC
GCGTTACGAT GGCGACCCGT GGGACCTGGT ACTGGACGGT TCTAAGGCGG CTTCCGCGCT
GCCAATCTTT TCTGTGCTGA CCCTGTCCGC GACCGGTTCT GAGATGGATG CATTCGCTGT
CATCAGCGAT ATGAGCAAAA ATGAAAAGTG GGGTACCGGC GCAGAGTGTA TGAAACCGAC
CATGTCTGTG CTGGACCCGT CTTACACCTT CAGCGTGAGC CCTAAACAGA CCGCGGCTGG
CACCGCCGAT ATGAT

ADH8 G2 (Accession No. E1QYZ8_OLSUV)

ACACCTTCAG CGTGAGCCCT AAACAGACCG CGGCTGGCAC CGCCGATATG ATGAGCCATA
CCTTCGAATC TTATTTTTCC ATGGACGAAG GTGCGTACGT CCAGAAGCGT CTGGCAGAAG
GTCTGCTGGG CACTATGATC CACTTCGGCC CGATTGCCCT GGCACATCCG GACGACTACG
ATGCGCGTGC GAACCTGATG TGGGCGGCTT CTCACGCAAT TAACGGCCTG GTTTCTGATG
GTTGTAGCCC TGCCTGGTGC GTTCACCCGA TGGAACACGA GCTGTCTGCA TTCTACGATA
TCACTCACGG CGAGGGTCTG GCGATCCTGA CGCCGGCATG GATGGAGCAC GTTCTGGATG
CTCAGACTGC TCCTCTGTTT GCTGCATACG GTTGCAACGT ATGGGGTCTG TCCGGCGTAG
ATGACATGAA AGTTGCTCGT GAAGCAATCA GCCGCACTCG TGCGTTTTTT GTTGAAGCTA
TGCATCTGCC GGCAACCCTG CGCGAGGTCG GCATTACCGA TGAAAAAAAC TTCGAAGTTA
TGGCTCGCAA AGCCGCCGAT GGTTGCAAAG GCAGCTTCGT TGCGCTGTCT CAGGACGACA
TCGTAGAAAT CTACCGTGCT GCTCTGTAAA CTAGTATCGA TGATAAGCTG TCAAACATGA
GCAGATCTGA GCCCGCCTAA TGAGC

ADH9 G1 (Accession No. F5X0G1_STRG1)

CGAGCGCCCG TAACTTCACG CGCCAACGTC GTTGTGTTCT GGCCGGCTAA TCTAGACTCC
TTCAATAAGC CCAGGGAGGA TTAAAGCATG AATGATTTCC AGTTTCAGAA CACTACCAAA
GTTTATTTCG GTAAACATCA GCTGCAACAC CTGCACCAGG AAGTGCTGAA ATACGGTCAG
AAAGTGCTGA TCGCTGATGG CGGTGAATTC ATCCGTCAGT CTCCGCTGTA TGCTCAAGTT
CTGAAAGAAC TGACGGACAA CGGCATCCAG ATCTTCGAAC TGGGTTCTGT GGAGCCGAAT
CCGCGCCACA CCACCGTTAA CCGCGAAGTA AAACTGTGTA AAGGCAACAA CATCCAGACC
GTACTGGCCG TTGGCGGCGG CTCCACGATT GACTGCTGTA AAGCGATCGC GGCGACCTCT
TGCACCGACG AAGACGACGT TTGGACCCTG ATCGAAAAAC GTGAACCGAT CAACCAAGCG
CTGGCGGTTA TCGCTATGCC GACCATCGCG TCCACGGGCT CTGAAATGGA CAAGAGCTGC
GTGATTGCCA ACGAAGAGCT GCACCTGAAA AAGGGTCTGA ACGGCGAAGC TATCCGTCCG
AAAGCGGCTT TTCTGAACCC GGAAAACACC TTCACCGTTC CGGCACGTCA GACCGCGTGT
GGTGGCTTCG ACATCATGAT GCATCTGCTG GATAT

ADH9 G2 (Accession No. F5X0G1_STRG1)

CGTCAGACCG CGTGTGGTGG CTTCGACATC ATGATGCATC TGCTGGATAT GAACTATTTT
GTAGACTCTG ATAAATATCC GCTGCAGTTC AATGTGGTAG AAACCCTGCT GCGCACTATT
CGTGAGCAGC TGCCGATCGC GCTGCGTGAG CCGGAAAACT ACGAGGCTCG TGCGACCCTG
CTGTGGGGTG CTTCCTGGGC GCTGAACTCT TTCTGTACCT CCGGTTTCAA AACCGCACCG
AGCAACCACG GTCTGGAACA ATTCTCTGCG TTCTACGATC AGACGCATGG TCTGGGTCTG
GCTCTGGTGG TTACCAAATG GATGACCTAC CTGCTGGAAA AGGACCCGAC CGTGGCACCA
GATTTCGCTC GTCTGGGCAC CAATGTGCTG GGCTGTCAGC CAGTTGACGA TGTGATCGAG
GGCGCAAAAA ACGCTATCAA AGCCTTTGAC GCATTCATTG TGAATGACCT GGGTCTGCCG
CGTACCATGA CTGAAATCGG TCTGAACGAC TCTAAGCTGA GCGAGATGGC TCATGCTGCG
GTAACCGGTT ATGGCGACGG CACGCTGAAG GGCTACCGTG AACTGACTGA AGCGAACTGC
CTGGCCATTT ATAAAATGTG CCTGTAAACT AGTATCGATG ATAAGCTGTC AAACATGAGC
AGATCTGAGC CCGCCTAATG AGC

ADH10 G1 (Accession No. E6W4G5_DESIS)

CGAGCGCCCG TAACTTCACG CGCCAACGTC GTTGTGTTCT GGCCGGCTAA TCTAGAGCCT
TAATCCCCGT AAGCACAGGA GATCCACAAT GCAGAATTTC GTTTTTCACA ACCCGACCCG
TATCGTTTTC GGCCGTGACA AGACGGCGAG CATCGGCAAG GCGACCCTGC CGTATGGTCG
CCGCGTTCTG CTGCTGACGG GTCAGGGTTC CGTCGTGAAA CACGGTATCC TGGCGAAAGT
GACCTCTTCC CTGTCTACTG CGGGTATCTC CTGGGTTGAG TGTAGCGGTG TGCAGCCGAA
CCCGGTTCTG GGCTTCGTGC GTCAGGCCAT CGACACTTTC CGTCGTGAAA ACCTGGACGC
CATTGTAGCG GTTGGCGGTG GCTCCGTGAT CGACACCGCG AAGGCGGTGG CTGCGGGCGT
TCGTTACGAA GGCGATGTTT GGGACTTCTT TACCGGTAAA GCTAACGTCC TGGACGCGGC
CCCGATCACT GTAGTGCTGA CTCTGCCGGC GGCTGCATCC GAGATGAACA GCGGCGGTGT
TATCACTAAT GAACAAACTC GTCAAAAATT CAACCTGGGC GGCGAACCGC TGTCTCCGAA
AGTTTCTATC CTGGACCCGG TCAACAGCTT TAGCGCCCCG GTGAATCACT CCCTGTACGG

TGTTGTTGAC GCGAT

ADH10 G2 (Accession No. E6W4G5_DESIS)

ACAGCTTTAG CGCCCCGGTG AATCACTCCC TGTACGGTGT TGTTGACGCG ATGGTTCATC
TGCTGGAGGG CTACTTCAAC GGCTCTGACC CGTGGACTCC ACTGCAGGAC CGTTACGCGG
AAGGTATCAT TCGCACTCTG ATGGAATGCG CTGCCATTAT TCGTGAACAG CCAGACCACT
ACGACGCACG TGCTAACATC ATGTGGGGCG CGACTCTGGC TTTCAACGGC CTGGCACCGT
GCGGTATCGG CCCGGCAGGT TTTCCGATGC ACATGATCGA ACACAGCCTG TCTGCACTGT
ATGATGTATC TCATGGTGCG GGTCTGGCGA TGATCCTGCC GGGTTGGCTG AAGTACCACT
CCGATTCCAG CCCGCGCAAA GTTAACCAGT TTGGCCGTCG TATTTTTGAA CTGGATCACC
AGGATGATCG TCAGGGCGCT CAAGCAGCCA TTGCCGAGCT GGAACGTTGG CTGCGTTCCA
TGGATATCCC GGCATCCCTG CACGAAGGTG GCATCCCGAT CGATGAGATC CCAGCAATTG
CGGAGAACGC TGTGATGCTG GCGCAGAAAT GGGGTCTGAA AGCTTACACT CAGGCCGTTA
TCGAAGACGT TCTGCGTCGC GCTTCTCGCT AAACTAGTAT CGATGATAAG CTGTCAAACA
TGAGCAGATC TGAGCCCGCC TAATGAGC

ADH11 G1 (Accession No. E6K7W2_9BACT)

CGAGCGCCCG TAACTTCACG CGCCAACGTC GTTGTGTTCT GGCCGGCTAA TCTAGATGAT
CCCTCCACAA CTAAAGGCGG TATTCAAATG AAAGACTTCA ACTTCTACGC ACCGACCCGT
GTAGTGTTCG GCAAACAGAG CGAAGAGCAG CTGCCGCGCC TGCTGAAAGA AGCGGGTGGT
AAAAAGGTTC TGGTACACTA TGGTGGCGGC TCTGCAAAAC GTTCTGGCCT GCTGGATAAA
GTGTATGGTA TGCTGGACGA CGCGGGCATC GAACATGTAG GTCTGGGCGG TGTAGTACCG
AACCCGCTGC TGTCCAAAGT AAACGAAGGC ATTGACCTGT GCCGTCGTAA AGGTGTAAAC
TTCATTCTGG CTGTAGGCGG CGGCTCCGTA ATCGATAGCG CGAAAGCAAT TGCGTATGGT
GTGCCGTACG AGGGTGACGT TTGGGATTTC TGGAATGGTA AGCCGGCAAC CGCTGCCCTG
CCGGTCGGTG CAATGCTGAC TATCCCGGCT GCTGGCTCTG AAATGAGCAA TTCTTGCGTG
ATTACTAAAG ACGAAGGTGC TGTTAAACGT GGCTTCAACA ACGATCTGTG CCGCTGTAAA
TTCGCGATCA TGAACCCAGA ACGCACTTAC ACGCTGCCGC CGTACCAGAC TGCCGCGGGT
GCGACCGACA TCATG

ADH11 G2 (Accession No. E6K7W2_9BACT)

CACTTACACG CTGCCGCCGT ACCAGACTGC CGCGGGTGCG ACCGACATCA TGATGCACAC
CATGGAACGC TACTTTTCCA AACATGAAGA CATGACCCTG ACCGACGCAA TTGCGGAAGC
CCTGCTGCGC ACGGTTAAAG AAAGCACCTT CGAAGTGCTG AAACACCCGG AGGACTACCG
TAACCGCGCT CAGATTATGT GGGCCGGCTC CCTGTCTCAT AACGATCTGA CCGAATGTGG
TCTGGAAAAG GATTTCGCGA CTCACCGCCT GGAACACGAG CTGTCTGCGC TGTTCGGCGT
TACCCATGGC GCCGGCCTGG CAGCCGTGTG GCCTGCATGG GCGCGTTATG TGATGAAGAA
ACACATTTCC CGCTTCGTTC AGTTCGCGGT CAACGTGATG GGCGTTCCGA ACGACTTTTC
TAACCCGGAA GCTACCGCTG AGAAAGGTAT CTGTCGTATG GAACACTTCT TCCACGCGAT
CGGTATGCCG ACCTCCATCA AAGAACTGCT GGGTCATGAT ATCACCGAAG CGCAGATTGA
CGAAATGGTT GACAAATGCT CTCGTGGTGG TACTATCACT GTTGGTGCCA TGGAGGTGAT
TGCCCCAGAC GACATGCGTG CGATCTACCG TATGGCACGC TAAACTAGTA TCGATGATAA
GCTGTCAAAC ATGAGCAGAT CTGAGCCCGC CTAATGAGC

ADH12 G1 (Accession No. B1C4Z8_9FIRM)

CGAGCGCCCG TAACTTCACG CGCCAACGTC GTTGTGTTCT GGCCGGCTAA TCTAGATGGT
TCTACAATAA TAGGAGGACT CTACACATGC TGGGCGACTT TACCTACTCC AACCCGACGA
AAATTTATTT CGGCGAGAAC TCTCTGGACA ACCTGTCTAC CGAACTGAAA AACTATGGCA
AGAACGTGCT GCTGGTATAC GGTGGTGGTT CTATCAAAAA AAACGGTATC TACGATAAGG
TTATCGACAT TCTGAAAAAG TGTGATAAGA CTATTATTGA GGATGCGGGC GTAATGCCTA
ATCCGACTGT TGAAAAGCTG TATGAAGGTT GCAAACTGGC TCGTGAAGGT AACGTTGACC
TGATTCTGGC GGTTGGCGGT GGCAGCGTGT GTGACTACGC GAAAGCAGTT AGCGTCAGCA
CGTATTGCAA CGAGGATCCG TGGGAAAAGT ACTACCTGCG TATGGAGGAC GTTGATAACA
AAATTATCCC AGTTGGTTGT ATCCTGACCA TGGTTGGTAC TGGTTCCGAA ATGAATGGCG
GCTCTGTTAT CACCAATCAT GAACAGAAAC TGAAAATTGG TCACGTTTTC GGCGACAATG

TGTTCCCGAA GTTCTCCATT CTGAACCCGA CCTTCACCTA CACGCTGCCG AAATATCAGA
TGATCGCTGG TTTCT

ADH12 G2 (Accession No. B1C4Z8_9FIRM)

AACCCGACCT TCACCTACAC GCTGCCGAAA TATCAGATGA TCGCTGGTTT CTACGACATC
ATGTCCCATA TCCTGGAACA GTACTTTAGC GGTGAAGACG ACAACACCTC TGATTATATC
ATGGAAGGTC TGCTGAAATC TCTGATCCAT TCTAGCAAAA TTGCCGTGAA CGATCCTACC
AACTACGAGG CTCGTTCTAA CATCATGTGG ATTGCAACCT GGGCTCTGAA CACCCTGGTG
GCTAAAGGCA AAACCACGGA TTGGATGGTT CACATGATCG GCCAGAGCAT CGGTGCTTAC
ACCGACGCCA CGCATGGTAT GACCCTGGCT GCCGTGTCCA TTCCGTACTA CAAGTACATT
TGTCCATACG GCCTGAACAA ATTCAAACGC TATGCGATTA ACGTTTGGGA TGTTCTGTCT
GAAGGCAAAA CTGACGAGCA GATCGCTAAC GAAGGTCTGG AATGTATGGA AAAATACATG
CGTGACCTGG GTCTGGTAAT GAACATTTCC GATCTGGGCG TCAAAGAAGA GATGCTGGAG
GGTATCGCTG AAGGTACGTT CATCATGAAC GGCGGTTATA AAGTACTGAC CAAAGACGAA
ATTATCACCA TCCTGAAACA ATCCATGAAA TAAACTAGTA TCGATGATAA GCTGTCAAAC
ATGAGCAGAT CTGAGCCCGC CTAATGAGC

ADH13 G1 (Accession No. G4L3E3_TETHN)

CGAGCGCCCG TAACTTCACG CGCCAACGTC GTTGTGTTCT GGCCGGCTAA TCTAGAACGT
AAGGCCACTA CATTAACTAA GGAGCAAAAT ATGGAAAATT TCGATTTCCA CGTTACTACT
GATATCCGCT TTGGCAAAGA CCGTCTGGGT GAACTGCCGC AGGTTCTGAA CAACTTCGGC
AAAAACGTGC TGCTGGTTTA CGGTGGTGGC TCCATCAAGC GTAATGGTCT GTACGACAAA
CTGTACGAAC TGTTCAACCA GAACGACAAT AACGTTGTTG AACTGGCGGG TGTAGACCCG
AACCCGCGCA TTGAAACCGT GCAAAAAGGT GTCCAGCTGT GTAAGGAACA CGCGATCGAC
GTCGTGCTGC CGGTAGGTGG CGGCTCTGTG ATTGACTGCT CCAAAGCTGT GGCGGCTTGC
GTCTTTGTTA GCGGTGACCT GTGGGAAAAC TTCGTGCTGC AGAAAAACTA TAAAGGCCCG
GCACTGCCGA TTGTCACCAT TCTGACGCTG GCCGCTACGG GCTCTGAGAT GAACGGTACG
TGCGTAATCT CTAACATGGA TGCGCAGATT AAACTGGGCG TCCACGGTAC CACCAACCTG
CTGCCAAAGG TATCCTTCCT GGATCCGACT AACACCTTCT CTGTTGGTGC ATACCAGACT
GCAGCTGGCT CCGCTGACAT CCTGAGCCAC CTGAT

ADH13 G2 (Accession No. G4L3E3_TETHN)

TGGTGCATAC CAGACTGCAG CTGGCTCCGC TGACATCCTG AGCCACCTGA TGGAGAACTA
TTTCAACGCG ACCGAAGGCA CCGAAGTTCA GGATGAAATC GCTGAAGGCC TGATGAAAAC
GGTGATCAAA TATCTGCCGG TGGCGCTGGA CGAACCGGAC AACTATATTG CCCGTGCTAA
CCTGATGTGG GCCTCTACTC TGGCGCTGAA CGGCCTGGTT GGCAAAGGTA AAAAAGGCAG
CTGGTCTTGT CATGCTATGG AACACGAACT GTCCGCTTTC TATGACATCA CTCACGGCGT
CGGCCTGGCT ATGCTGACCC CGCGTTGGAT GGCACACATC CTGGACGAAG ACACCCTGCC
GAAATTTCAA CGTTTTGCTG AAGAGGTCTG GAATGTTAAA GAAAAGGAAC CGAAACGTAC
GGCGGAGATC GGCATTCAGA AACTGTACGA TTTTTTCGTC TCCTGCAACA TCCCTATGAC
CCTGTCCGGT GTGGGCATCC AGACCGAAGA AAATTTTGAA GAAATGGGTC AGCGTGCCGT
TGCTCACTCC TCCATCTCTA ATCAGGGCTT CGTACCGCTG CACGAGGACG ACGTGGTCTC
CATCTATCGC GACTGCATGT CCGAGTCTTC TTTCGTCTAA ACTAGTATCG ATGATAAGCT
GTCAAACATG AGCAGATCTG AGCCCGCCTA ATGAGC

ADH14 G1 (Accession No. E8LLW8_9GAMM)

CGAGCGCCCG TAACTTCACG CGCCAACGTC GTTGTGTTCT GGCCGGCTAA TCTAGAAGTA
TATTTCCCGC TCAATATAAG GAGGAGTACA TATGGAATCT TTCGATTTTT TCCGTCGCAC
TCGTATCATC TTTGGCCAGT CTGCGGACAA CGAAGTAGGT CAGATTATCA AATATCAAGG
TGGCACTCGT GTGCTGCTGC TGCACGGTGA AAAAGCAGCG ATCAAGTACG GTATTGTGGA
GCGTATTGGT CGTACTCTGG ACCGTTCCGG TCTGAAATAC TTCTCCAAAG GCGGCATCAA
GAGCAACCCG CATATTGATA AAGTTTACGA ATGCATTGAA TTCTGCCTGT CCAACTCCAT
TAATTATATC CTGGCTGTGG GTGGTGGTTC CGTGATCGAC ACCGCCAAAA TCGTCGCGGC
GGGCGTATTC TTCGACGGCG ACATCTGGGA CATGTTTGAA AAACATCGCG AACCGTACCG
TTCCCTGCCG CTGGGCTGCG TAGTTACCGT TCCTGCAAGC GGTACTGAAT GCAGCAACTC

TTCTTCCCTG ATGCGTGAAA AAGACGGCCG CCGTGAAAAA CTGATCGCGT ATTCTAACAG
CTTCGTACCG GAGTTCGCCA TTCTGAACCC GGACCTGACG CTGTCTCTGT CTCCGCGTGT
GACCGCTAGC GGTTGCGTTG ATATGATTAA CCATG

ADH14 G2 (Accession No. E8LLW8_9GAMM)

CTCTGTCTCC GCGTGTGACC GCTAGCGGTT GCGTTGATAT GATTAACCAT GTCCTGGAAG
GTTATTTCTC CAACTCTACC GGTGTACTGC TGAGCGATAA GCTGTGTGAA GCGGTTCTGA
GCTCTATTAT CGAACTGCTG CCGCAGATCT ATGAAGATCC GAATAACATT GATGCGCGCG
CAAACCTGAT GCTGGCAGCA ACCCTGTCTC ACAATGATAT CTGCTGCATG GGCCGCAAGT
CCGACAACGT TATCACGAAA CTGGCCAACC AGCTGGTGGT TGAAAACGAT TGTCCGTTCG
GTGATGCACT GGCTGTTCTG ATCCCGGCTT GGATGGAATA TGTTGTTCAG TTTAACCCGC
TGCGCATCGC ACAATTCTCC AACCGCGTTT TTGGTATCGC AATCAACTTC GAAGATCCGA
AAATTACCGC GTATGACGGT ATCAAAGCCC TGCGCGCTTT TTTCAAAAAT GTAAAACTGC
CGTGCAACTT CGTTGAACTG GGTATCAAGA CCGAAGCAAT CGCGGACATC GTAAACGCTC
TGGACCTGAA AGAAGGTAAA ACTCTGGGTT CTTTTGTGCC GCTGGACGCT GTGGCCTGCG
AAGCAATCCT GTCCCTGGCC GCCAATTACT GCGAAGGTCG CGATATTTTC TAAACTAGTA
TCGATGATAA GCTGTCAAAC ATGAGCAGAT CTGAGCCCGC CTAATGAGC

DhaT2 G1 (Accession No. E4RKV2_HALSL)

CGAGCGCCCG TAACTTCACG CGCCAACGTC GTTGTGTTCT GGCCGGCTAA TCTAGATCCT
TACCGCTTAC CACGAAATAA AGAGGGAAAA ATGTCCGACT ACTATGATTA TATGCTGCCG
ACCGTTAACT TCATGGGCCC GGGCTGTGTG GAGGTTGTGG GCGAACGTTG CAAGATCCTG
GGTGCTAAAA AAGTTCTGAT TGTTACCGAT TCTTTCCTGC GTAACATGGA AGGCGGCCCG
GTCGACCAGG TGGTCAAATA CCTGAAAAAG GCGAATCTGA ATTACGCTTT TTACGACGAG
GTTGAACCGA ACCCGAAAGA CGTTAACGTT TACGCCGGTC TGAAAATTTA CGAACGTGAA
AACTGCGATA TGATCGTTAC CATTGGTGGT GGTTCCGCTC ACGATTGTGG TAAAGCTATT
GGTGTTGCTG CTACTCATGA CGGTGATCTG TACAAAGACT ACGCTGGCAT CGAAAAGCTG
GAAAACGAAA CTCCGCCGAT GGTATGTGTG AACACCACTG CTGGCACCGC TTCTGAAGTT
ACTCGTCACA CCGTGATTAC TGACACCAGC CAGACGCCTA ACGTCAAGTT CGTGATTGTA
TCCTGGCGTA ACACTCCAGA TGTGTCTATC AACGATCCGG AACTGATGGT TGGTAAGCCG
CCGGGTCTGA CCGCAGCTAC TGGCATGGAC GCTCTGACTC ACGCGGTTGA AACCTATGTG
AGCACCAATG CGAAC

DhaT2 G2 (Accession No. E4RKV2_HALSL)

CATGGACGCT CTGACTCACG CGGTTGAAAC CTATGTGAGC ACCAATGCGA ACGCGCTGAC
TGATGCCGCG GCTATTAAGT CTATTGAACT GGTTGCTAAT AACCTGCGTA AAGTTGTTAA
AGATGGCCAG GACATCAAAG CGCGCGAAAA TATGGCGAAC GCTTCCGTTC TGTCTGGTTT
CGCGTTTAAT AACGGTGGTC TGGGTTACGT TCACGCTATG GCACACCAGC TGGGCGGCTT
CTACGACATG CCTCACGGTA TCGCAAATGC AATTCTGCTG CCGTACGTCG AGAAATTCAA
CCTGGGTACC GACGTTGAAC GTTTCAGCAA CATCACTGAA ATCTTCGGCA AAGAACAGTC
TAAAATCAGC AATAATCCGG AAGCACAGGA AAGCATCAAA GCCATCAAAG ACGAAATCGA
TAAACTGAAA CGCTTTAAAA AAATTGCAGA AGTGTTTGGC GTGGATACCT CTAACATGTC
TACCCGCGAA GCTGCAGAGG CTAGCCTGGA TGCCATCAAA GAACTGGCCC GTGATATCGG
TATTCCGAGC TCTCTGTCTG AGTCTAAATT CGACGTTAAA CGTGACGATT TCGAGGAAAT
GGCTAAACTG GCGCTGGAAG ATGGTAACGC GGGCACCAAC CCGCGTAAAG GTTCTGTAGA
AGATATTGTT CGTATCTTCG AGGATGCGTT CTAAACTAGT ATCGATGATA AGCTGTCAAA
CATGAGCAGA TCTGAGCCCG CCTAATGAGC

DhaT3 G1 (Accession No. Q15G22_CITFR)

CGAGCGCCCG TAACTTCACG CGCCAACGTC GTTGTGTTCT GGCCGGCTAA TCTAGATAAT
AGCAATACTA ATAAAGAGGT CTCCTAATGA GCTATCGCAT GTTCGACTAC CTGGTCCCGA
ACGTGAACTT CTTCGGTCCA AACGCAATCA GCGTGGTGGG TGAACGCTGC CAGCTGCTGG
GTGGTAACAA AGCTCTGCTG GTGACCGACA AGGGTCTGCG CGCTATCAAA GACGGTGCGG
TAGACAAGAC CCTGCATTAC CTGCGTGAGG CGGGTATCGA GGTTGCTATC TTCGATGGCG
TTGAACCTAA CCCGAAGGAT ACTAACGTGC GCGACGGTCT GGCAGTTTTC CGCCGTGAAC
AATGCGATAT TATTGTGACG GTTGGTGGCG GTTCCCCGCA TGATTGCGGC AAAGGTATCG

GCATCGCTGC TACGCACGAA GGTGCGATCT GCACTTCTAT GCCGGAATCC CGTCCGTGGA
CCAACCCGCT GCCTCCGATC GTGGCCGTAA ACACCACTGC AGGTACCGCC AGCGAAGTGA
CCCGTCACTG TGTTCTGACC AACACCGAGA GCAAAGTAAA GTTCGTTATT GTCTCCTGGC
GTAACCTGCC GTCTGTGTCC ATCAATGACC CGCTGCTGAT GATCGGTAAA CCGGCTGCCC
TGACGGCAGC CACCG

DhaT3 G2 (Accession No. Q15G22_CITFR)

TGACCCGCTG CTGATGATCG GTAAACCGGC TGCCCTGACG GCAGCCACCG GCATGGACGC
TCTGACCCAC GCAGTGGAGG CATACATCTC CAAGGATGCC TCCCCGGTTA CTGATGCAGC
GGCTATGCAG GCAATCCGTC TGATCGCCCG TAACCTGCGC CAGGCCGTTG CTCTGGGCAG
CAACCTGCAG GCTCGTGAAA ACATGGCGTA CGCTAGCCTG CTGGCTGGTA TGGCATTTAA
TAATGCGAAC CTGGGTTACG TGCACGCAAT GGCCCACCAG CTGGGTGGTC TGTACGACAT
GCCACATGGC GTGGCGAACG CAGTTCTGCT GCCGCACGTT GCCCGCTACA ACCTGATCGC
GAATCCGGAA AAATTCGCGG ACATCGCGGA ACTGATGGGC GAAAATATCA CCGGTCTGTC
TACTCTGGAC GCGGCAGAGA AAGCTATCGC AGCGATCACC CGTCTGAGCA TGGATATTGG
TATCCCGCAA CATCTGCGTG ACCTGGGTGT CAAAGAAGCG GACTTCCCGT ACATGGCGGA
AATGGCACTG AAAGACGGTA ATGCGTTCAG CAACCCGCGT AAAGGTAACG AGCAAGAGAT
TGCGGCTATC TTTCGTCAAG CTTTTTAAAC TAGTATCGAT GATAAGCTGT CAAACATGAG
CAGATCTGAG CCCGCCTAAT GAGC

DhaT4 G1 (Accession No. A0PY50_CLONN)

CGAGCGCCCG TAACTTCACG CGCCAACGTC GTTGTGTTCT GGCCGGCTAA TCTAGAATAC
GGAAACCTCA CGTATAACCA AGGAGGTTAC AATGCGCATG TATGACTACC TGCTGCCTAA
CGTTAACTTC ATGGGCCCGG GCTGCATCAA AGTTATCGGC GAACGTTGCA AACTGCTGGG
CGCTAAAAAA GCGTTCATCG TAACCGGTAA ACACATTGGT AGCATGGAAA ACGGTCCGCT
GCAGATCGTT GTAAAATACC TGACCGATGA AGGTATCGAC TACGTTCACT TTAGCGGCTC
TGAACCGAAT CCGAAAGACA TTAACGTGCG TAAAGGTGTT GAACTGTTCA AAAAAGAAAA
CTGCGATATG ATCATTACCA TCGGCGGTGG TTCTGCACAT GACTGCGGTA AAGGTATTGG
CATCGGCGCG ACGCACGAAG GTGACCTGTA CGACTACGCA GGCATCGAGA CTCTGACCAA
CCCACTGCCG CCTATTGTAG CGGTGAACAC CACCGCGGGC ACGGGCTCCG AAGTTACCCG
TCACTGTGTG CTGACGAACA CCGAGAAAAA AATCAAATTC GTAATCGTGT CTTGGCGTAA
TCTGCCGCAG GTGAGCATCA ACGATCCGCT GCTGATGGTG GATATGAGCC CGCGTCTGAC
TGCGGCGACC GGTAT

DhaT4 G2 (Accession No. A0PY50_CLONN)

TCCGCTGCTG ATGGTGGATA TGAGCCCGCG TCTGACTGCG GCGACCGGTA TGGATGCACT
GACTCACGCG ATTGAGGCCT ACGTGAGCAA AGACGCAAAC GTGGTTACGG ACGCGGCGGC
AATTCAAGCG ATCAAACTGA TCAGCAAAAA CCTGCGTAAA GCCGTCGCAC TGGGCGAAAA
CCTGGAGGCC CGTGACAACA TGGCAAACGC TTCTCTGCTG GCAGGCATGG CCTTTAACAA
TGCGAACCTG GGTTATGTTC ATGCGATGGC TCATCAGCTG GGCGGTCAGT ACGACCTGGC
CCACGGTGTT GCAAACGCCA TGCTGCTGCC GCATGTCGAA CGCTACAACA TTATCTCTAA
CCCAGAAAAA TTCCGTGACA TCGCTGAGTT CATGGGTGAG AATATCGAGG GTCTGTCTGT
CATGGAGGCT GCAGAAAAAG CAATCGATGC GATGTTCAAA CTGGCCGAAG ACATTGGCAT
TCCGCGTCGC CTGCGTGACG TAGGTGTCAA GGAAGAAGAT TTCGAATATA TGGCGGGCAA
CGCGCTGAAA GATGGTAACG CATTTTCTAA CCCTCGTAAG GGCACTGAAG AAGATATTGT
CAACATTTTT AAAGCTGCAT ACTAAACTAG TATCGATGAT AAGCTGTCAA ACATGAGCAG
ATCTGAGCCC GCCTAATGAG C

DhaT5 G1 (Accession No. Q3A1K9_PELCD)

CGAGCGCCCG TAACTTCACG CGCCAACGTC GTTGTGTTCT GGCCGGCTAA TCTAGAAATA
TTATCTCTAA TCATAAAAGG AGGTTCAAAC TATGGCGGAT TTCCTGTGCC CTGCTGTTAA
CTTTATTGGC GCGGGTACCG TAGCAGAAAC TGGCCCGCGT GCTGCGATGT TCGGTACGAA
AGCTCTGATC GTGTGCGACG GCTTCCTGGC CAAACTGGAG GGCGGCCCTG TAAGCAAAGT
GAAAGATACG CTGACTTCCT CTGGCGTTGA GTTCGCAGTT TATGACGGCG TGGAACCGAA
TCCAAAAGAT ACGAACGTAG CAGCCGGCCT GAAAATTTAT AAATCTGAAA ACTGTGACCT

GATCGTAACC GTTGGTGGCG GCTCCTCTCA TGATTGCGGT AAAGGCATCG GCATCGCAGC
TACTCACGAG GGCGACCTGT ACGAAGACTA CGCCGGTATC GAAACCCTGA CTAACGAACT
GCCACCGATC ATCGCGGTAA ACACCACTGC TGGCACTGCG AGCGAGGTTA CGCGTCACTG
CGTGATCACC AACACGGCGA AAAAGGTTAA GTTCGTTATC GTTTCTTGGC GTAACCTGCC
AAAAGTGTCT ATCAATGACC CGGAGCTGAT GGTTGCAAAA CCGGCTGGTC TGACCGCCGC
GACCGGTATG GACGC

DhaT5 G2 (Accession No. Q3A1K9_PELCD)

GCTGATGGTT GCAAAACCGG CTGGTCTGAC CGCCGCGACC GGTATGGACG CACTGACCCA
CGCAGTTGAG TGTTACGTAA CTAAGGACGC GAACCCGGCG ACTGATGCTG TGGCTATCCA
CGCTATCAAA CTGATCGGCA AGTACCTGCG TCGCGCAGTG GCAAACGGTG AAGACCTGGA
AGCGCGCGAA GGTATGGCTT ACGGCTCTCT GCTGGCTGGT ATGGCTTTCA ACAACGCGGG
CCTGGGCTAT GTTCACGCTA TGGCGCACCA GCTGGGCGGT CTGCTGGATA TGCCGCACGG
CATCGCAAAC GCGGTGCTGC TGCCGCATAT CGAACGTTAC AACCTGATGG TGAACCCGGA
AAAATTCGCC GATATTGCGG AGGCGATGGG TGAAAACATC GATGGTCTGG GTAAAATGGA
AGCTGCTGAA AAGGCTATCG ATGCTATCGT TCGCCTGTCC ATTGATGTTG GTATTCCGCA
GCATCTGGCT GACCTGGGCG TTAAAGAATC CGATCTGGAG CCGATGGCGA AACTGGCCAT
GCAAGATGGC AACGCAGGTA CTAACCCGCG TGTTGGCAAA GTTGAAGATA TCATCCAACT
GTTCAAAAAC GCAATGTAAA CTAGTATCGA TGATAAGCTG TCAAACATGA GCAGATCTGA
GCCCGCCTAA TGAGC

DhaT6 G1 (Accession No. A5D4X5_PELTS)

CGAGCGCCCG TAACTTCACG CGCCAACGTC GTTGTGTTCT GGCCGGCTAA TCTAGATTCC
ATTTTTCTTC CACCAAAAGG AGTTACTTCC ATGTATTACG ATTTCCTGAA CCCGTCCGTT
AACTTTTTTG GCCCGGGTTG TGTCTCCGTT GTAGGCGAGC GTTGCAAGAT CCTGGGCGGC
AAAAAAGCTC TGATTGTTTG CGATCCGTTT CTGGCAAAGA TGGAAGGCGG TCCGGTGGAA
CAGGTACTGG GTTACGTTCA GGAAGCGGGC CTGAAAACCG TGGTCTTTGA CGGTGTGGAA
CCAAACCCAA AAGACAAAAA TGTACACGCA GGCCTGAAAG TGTTCAAAGA AGAAAAATGC
GATATGATCA TTACTGTTGG TGGCGGTAGC GCGCACGATT GTGGCAAAGG TATTGGTATC
GCGGCTACCC ACCCGGGTGA TCTGTACAAA GACTACGCGG GTATTGAAAA ACTGACCAAT
CCGCTGCCAC CGATTGTTGC AGTGAACACC ACTGCTGGTA CCGGCTCCGA AGTTACTCGT
CACTGCGTTC TGACTAACAC CTCCACTTCC ATCAAATTCG TCATTGTCTC TTGGCGCAAC
CTGCCACTGG TTTCCATCAA CGATCCGATG CTGATGCTGA AAAAGCCGGC GGGTCTGACT
GCGGCCACTG GCATG

DhaT6 G2 (Accession No. A5D4X5_PELTS)

TCCGATGCTG ATGCTGAAAA AGCCGGCGGG TCTGACTGCG GCCACTGGCA TGGATGCTCT
GACGCACGCA GTCGAATGCT ATGTTACCAA AGCTGCAAAC CCGGTGACGG ACGCACTGTG
TGCGCAATCC ATCAAACTGA TCGCGAATAA CCTGCGTCAG GCGGTGGCGA ACGGTGAAAA
CCTGACCGCT CGTGAAAACA TGGCATATGC TAGCATCCTG GCGGGCATGG CCTTCAACAA
CGCCGGTCTG GGCTATGTTC ATGCAATGGC TCACCAACTG GGTGGCTACT ATGACATGGC
GCACGGTGTG GCGAACGCTA TCCTGCTGCC GCACGTGGCT CGCTTTAACC TGATCAGCAA
CCCACAAAAA TTCGCGGATA TCGCAGTGTT TATGGGTGAA AACATCGAAG GTCTGTCCGT
ACGTGCGGCG GCAGAAAAAG CGATTGACGC CATTGTTCAG CTGTCCAAGG ATGTGGGCAT
CCCATCTGGC CTGGCTGAGA TGGGTGTAAA AGAGGAAGAT TTTGACAAAA TGGCGAAAAC
GGCACTGGAG GATGGTAACG CTGGCTGCAA CCCGATTGTG GGTACCCACC AGGATATTGT
GAAGCTGTTC GCGGCTGCTA TGTAAACTAG TATCGATGAT AAGCTGTCAA ACATGAGCAG
ATCTGAGCCC GCCTAATGAG C

DhaT7 G1 (Accession No. B1V2D9_CLOPF)

CGAGCGCCCG TAACTTCACG CGCCAACGTC GTTGTGTTCT GGCCGGCTAA TCTAGAAGCC
TAGGCTAAGA AGCATAAGGA CCCCACTATG GAAGAGAACG AAATGCGTAT GTATGACTAC
CTGGTTCCGA GCGTGAACTT CATGGGTGCT AACAGCATTT CCGTTGTAGG CGAGCGTTGC
AAAATCCTGG GTGGCAAGAA AGCTCTGATC GTTACCGACA AATTCCTGCG TGGCCTGAAA
GGTGGTGCAG TTGAACTGAC GGAAAAATAC CTGAAGGAGG CGGGCATTGA AGTAGCATAC

TACGACGGCG TAGAACCGAA CCCGAAAGAC ACTAACGTGA AAGATGGTCT GAAGATCTTT
CAGGACGAGA ACTGTGATAT GATTGTAACC GTTGGTGGTG GTTCCTCCCA CGACTGCGGC
AAGGGCATTG GTATCGCGGC GACTCACGAA GGCGATCTGT ACGACTATGC AGGCATTGAA
ACCCTGACCA ACCCGCTGCC TCCGATCGTG GCTGTAAATA CTACCGCCGG TACGGCAAGC
GAAGTTACCC GCCACTGCGT CATCACTAAC ACCAAAACTA AAGTTAAATT CGTGATTGTT
AGCTGGCGTA ACCTGCCGCT GGTCAGCATT AATGATCCGA TGCTGATGGT TGGTAAGCCG
GCGGGCCTGA CCGCA

DhaT7 G2 (Accession No. B1V2D9_CLOPF)

CAGCATTAAT GATCCGATGC TGATGGTTGG TAAGCCGGCG GGCCTGACCG CAGCAACTGG
CATGGATGCT CTGACCCACG CAGTTGAAGC TTACGTTTCT AAAGATGCCA ATCCTGTTAC
CGACGCGGCA GCAATTCAGG CAATTAAACT GATTTCCTCC AATCTGCGTC AGGCGGTAGC
CCTGGGCGAA AACCTGGTGG CTCGTGAAAA CATGGCGTAT GGCAGCCTGC TGGCTGGTAT
GGCCTTCAAC AACGCAAACC TGGGCTATGT GCACGCTATG GCGCACCAGC TGGGCGGCCT
GTACGACATG CCACACGGTG TTGCTAACGC GATGCTGCTG CCTCACGTGT GTAAATATAA
TCTGATCAGC AACCCGCAGA AGTTCGCTGA TATCGCCGAA TTTATGGGCG AAAACATCGA
GGGCCTGTCC GTGATGGACG CGGCACAGAA AGCGATCGAC GCGATGTTCC GTCTGTCTAC
GGATATCGGC ATCCCTGCTA AACTGCGCGA TATGGGCGTT AAGGAGGAAG ACTTCGGTTA
CATGGCCGAA ATGGCGCTGA AAGATGGCAA CGCGTTTTCC AATCCGCGCA AAGGCAACGA
ACGCGATATT GTTGAAATTT TCAAAGCAGC TTTCTAAACT AGTATCGATG ATAAGCTGTC
AAACATGAGC AGATCTGAGC CCGCCTAATG AGC

DhaT8 G1 (Accession No. E3H9G9_ILYPC)

CGAGCGCCCG TAACTTCACG CGCCAACGTC GTTGTGTTCT GGCCGGCTAA TCTAGAAGCC
TAACTTAAAT TTAAAAGGAG GCCCTTATGC GTTACTACGA CTATCTGATG CCGTCTGTGA
ACTTTTTCGG TCCGGGTTGC CTGGAAGTGA TCGGCGAACG TGCAAAAATC CTGAATGGCA
CTAAAGCTCT GATCGTTACG GACAAATTCC TGTCTTCCCT GAAAGGCGGT GCTGTTGAAA
AAACCCTGGA GTATCTGAAA TCCGCTGGCG TTGAAGCCGT TGTATTTGAT AACGTGGAAC
CGAACCCAAA GGATACCAAC GTTTACGAGG GTGCAAAAGT ATATAAGGAA AACAATTGCG
ATATGATCAT CACCGTGGGC GGTGGTAGCC CACACGACTG CGGTAAGGGC ATCGGTATTG
CAGCGACCCA TGACGGCGAC ATCTGTGATT ATGCCGGTAT TGAAACCCTG ACCAACGCGC
TGCCGCCGAT CATCGCTGTT AACACCACCG CTGGCACTGC TTCTGAAGTT ACTCGTCACG
CCGTCATTAC TAACACTAAG ACCAAAGTTA AATTTGTGAT CGTGAGCTGG CGTAACCTGC
CACAAGTTAG CATCAACGAC CCGCTGCTGA TGATCGGTAA ACCGGCTGGT CTGACCGCAG
CTACCGGTAT GGACG

DhaT8 G2 (Accession No. E3H9G9_ILYPC)

GCTGCTGATG ATCGGTAAAC CGGCTGGTCT GACCGCAGCT ACCGGTATGG ACGCTCTGAC
CCATGCTGTG GAAGCTTACA TTTCCAAGGA CGCGAACCCA ATTACTGATG CTGCGGCAAT
CCAAGCGATC AAACTGATCG CCCAGAACCT GCGTCTGGCC GTGGCCAACG GCGAGAACCT
GAAAGCGCGT GAAAACATGG CGTACGCTTC TGTACTGGCC GGTATGGCAT TTAACAACGG
CAACCTGGGT TACGTTCACG CGATGGCGCA CCAGCTGGGC GGCCTGTATG ATATGCCGCA
CGGCATCGCA AACGCAATGC TGCTGCCGCA CGTGTGTAAA TATAACATGA TCTCTAATCT
GGATAAGTTT GCAGATATCG CAGAATTTAT GGGTGAAAAC GTTGATGGCC TGTCTAAATC
TGAAGCGGCC GAAAAAGCGA TCTCTGCGAT GTTCCGTCTG TCTTCCGATC TGGGCATTCC
GACCTCTCTG GAAGAAGCAG GCATCAAAGA ATCCGACATT GAACTGATGG CTGAGAATGC
CCTGAAGGAT GGTAACGCGT TCTCTAACCC ACGTAAAGGC AACGAGAAAG ATGTTGAAAA
CATTTTTAAA GCGGCGATGT AAACTAGTAT CGATGATAAG CTGTCAAACA TGAGCAGATC
TGAGCCCGCC TAATGAGC

ADH15 (Accession No. Q1JYE4_DESAC)

GATACAGGTC TCGTCTAGAA GAGATCATAA TAGAGAGGAT ACC**ATG**CAGC CGTTCGTGTT
TCATAACCCT ACCGAAATCG TTTTCGGCGT TGACACTGCT GATAAAGTAG GCAAATACGC
CGCACGTCAG GGTGGTAAAG CCCTGCTGGT TTATGGCCGC AACTCTATCA AAACCACTGG
CCTGTATGAT CGCGTAACTG CTAGCCTGCA GGCCGCCGGC CTGAGCTGGG TTGACCACGG

CGGTGTCAAA TCCAACCCGG TTCTGAGCCA CGTGCGTGAA GGCGTTGCAG TTGCAAAACG
TGAACAAGTA GACGTTGTTG TCGCAGTAGG CGGCGGTAGC GTTCTGGATG AGTCTAAAGC
GATCGCTGCA GGCGCGCTGT GCGATCACGA TGTTTGGGAG TTCTTCCTGC AGGCTAAAGT
CGAGAAAGCG CTGCCGCTGG TTACTGTTCT GACTCTGGCT GCAACGGGTT CCGAAATGAA
CAGCGGCGGC GTTGTAACCA ACGAGAACAC CGCTCAGAAA TTCAACATCG GCTCCCCGCT
GCTGTTCCCG AAAACGTCTA TTCTGGACCC GGCACTGACC TATACTGTTC CGGCTGATTA
CACCGCATAT AGCGCCGTGG ATGCGATCTC TCACATCATC GAAGGTTATT TCACCTCCAA
CGATCAGGCA ACTCCTCTGC AGGACCGTTT CGTAGAAGGC CTGGTGAAAA CCATCATGGA
GTCCACCGAG CAGATTCTGC AGCAACCGGA TCACGCGGAC GCGCGTGCTA CCATGATGTG
GTCTGCCACT TGGGCTCTGA ACGGCCTGTC CACTGCTGGT ATTGGTCTGT ATCAATTCCC
GAACCACATG ATCGAACACT CTCTGTCCGC TATGTACGAC ATCGCCCATG GTGCCGGTCT
GTCCATTGTA ATCCCAGGTT GGATGGATTA TGCGGCGACC CAAAACCCGG CTAAATTCGC
TCAGTTTGCA CGTCGTGTTT TCGACTGTGA ACTGAGCGAT GACCTGGAAT GCGCTCGCTA
CGGCATCGAA GCGCTGAAAA CGTGGTTTCA TTCTATCGGC TCTCCGGTGT CCCTGGCTCA
GGGTAACATT CCTGATGAAG AGATCGGCGC TATCGCAGAT AACGCTGTAA TGCTGGCCCG
CAAATGGGGT CTGAAAGCGT ACACCGCCGA AGTTATTGCC GACATCCTGA GCCGCTGTCG
TAGCTAAACT AGTAGAGACC GATACA

ADH16 (Accession No. B5YIE2_THEYD)

ATGGAAAACT TTGAGTTCTA CAACCCGACG CGCATTATCT TTGGCAAAGA AGCCGAAAAG
AAGATCGGCA AAATCCTGGA GAAAGACGAC GTTGAACGTG TGCTGTTCGT GTATGGTAAA
AGCTCTATCA AAGAGACAGG CCTGTATGAT CGCATTGTTA AGGCTCTGAA AAAAGAAGGC
ATCGAATTTA TTGAGCACGG TGGTGTGAAG CCGAATCCGG TGCTGTCCCA CACCCGTGAA
GGTATTGAAA AAGCGAAGAA GCACAAGGTA GACGCGATTC TGGCTGTAGG CGGCGGTAGC
GTTATCGACG AAGGCAAAAC TATTGCAGTC GGTACCAAAA CCGACAAAGA CGTTTGGGAT
TTCTTCAAAC GTAACAAAGA AATTAAAAAA GCACTGCCGA TTTATGTGAT CCTGACTCTG
GCGGCAACCG GTTCTGAAAT GAACGGTTTC GCTGTAATCA CCAACGAAGA AACCCAGGAA
AAGCTGAGCA TCTCTTCTGA ACACATCTTC CCGCGTGTTT CTATCCTGAA CCCGGAACTG
ACCTTCACCG TATCCGCTAA ATATCAAGCG TACGCGGCAG TAGACGCAAT CGCGCACGTT
ATCGAACACT ATTTCTCCGG TTCTTACTGC CCGAACCTGC AGAACCGTTT CGTTGAGGGT
CTGATCAAAA CCGTAATGGA AACCACCGAA ATCATTCTGA AAGAACAGAA GAACTACAAC
GCTCGTGCAG AATTTATGTG GGCGGCTACC CTGGCCCTGA ACGGCCTGGC AAAGCTGGGC
ATCAAAGGCG GCTCCTTCCC GAACCACATG ATTGCACATT CCCTGGGTGC TATCTACGAT
CTGCCACATG GTGCTTGTCT GAGCATCGTA ATTCCGGCGT GGATGAAATG GTACCAAGAA
AAGAACCTGA TTCAGTTCGA ACGCTTCGCC AAAGAAATCT TCGGCGTCAA CACTGCTACC
GAGGGTGTGT TTCAACTGAA AGAATGGTTT CGCAAAATCG GTGCGCCGGT TTCTCTGAAA
GAGGCAGGCA TCTCCATTGG CGAGATCGAT CGTATTGTAG ACAATGCGTA TAACATCGCG
AAAGTCTGGC AGATGGAAAA AGACTACACT AAGGAGGTAC TGACCGAAAT TATCAAAAAC
GCTAACGATT AA

ADH17 (Accession No. D2BSS7_DICD5)

GATACAGGTC TCGTCTAGAT AGCCAGATTA AGGAGCAGCA AAAATGGACA ATTTTAGCTT
TTATAACCCG ACCCGTATCG AATTCGGTGC TGGCAAAGAA CAGCTGATCG GTGAAATCAT
GGCTTCTCAC GGCATTAAGA AAGTCCTGCT GTCCTATGGT AGCGAACGCA TTAAAGATAA
CGGCCTGTTC GTGACCGTTT CCGACTCTCT GAACCGTCAC GGCATCACTC TGATCGAATG
CGGTGGTATC ATCTCTAATC CGCTGATTTC CAAAGTACGT GATGCGATCA CCGTAGCTAA
AGAGCAGAAT GTTGACGCCA TCCTGTCTGT TGGTGGTGGT TCTGTGCTGG ATTCCGCAAA
AGCAATCGCA GCCGGTTCCC TGTATCAGGG TGACGTGTGG GACCTGTTCA TCGGTAAGGG
CCAGATTGAC GCAGCACTGC CAGTTTTCGC CATCCTGACT CTGGCGGCGA CTGGTTCTGA
AATGAACTCT GGTGCGGTGG TGACTAACGA CGACACCAAA GAAAAATTCG CAATCAACAG
CGTACACATC TTCCCGAAAG TGTCCATTGT AAACCCAGCT CTGATGCAAA CCGTTTCCCG
TGACTACCTG GTGTATTCTG CTGCAGACAT CATTGCACAT TCTATTGAAG GTTACTTCAC
TGCGACCATT CAGCCGAAAA TTCAGTCCCG TCTGGTTGAA TCTGTCATTG CTACCGTTCT
GGAAACTACC GAACAACTGC TGGCTGACAG CGCAGACTAT AACGCTCGCG CAGAATTCGC
TTGGGCTGCG ACCCTGGCGC TGAACGGTCT GACCTATGCT GGCACCTCCG GTTTCGGTTA

CCCTAACCAC ATGATTGAAC ACGCGCTGTC TGCACTGTTC AACGTACCGC ATGGTGCTGG
CCTGAGCGTT ATCATGCCTG CATGGATGAA GTGGTTCCAC TCCCAGAACA CTGCTCAGTT
CGAACGCTTC GCCCAGCACC TGTTCGGCCT GAACACCGCG GAAGAGGGCA TCGCTGCTCT
GGAGAAATGG TTCGATAAAA TTGGTACCCC GACTCGTCTG AGCCAGCTGG GCATCAAAGC
CACTGACCTG CCGGCTATCC TGGACAACCT GGAAGGTAAC GCGCGTTGGT TCGGTCTGGC
AGAAACTTAT ACCGAGGAAG TACTGGCGAC CATCCTGCGT CTGGCACTGT AAACTAGTAG
AGACCGATAC A

ADH18 (Accession No. F0ERB1_HAEPA)

GATACAGGTC TCGTCTAGAC ACGACAAGAC AGGGGGCCAA TCCATGTATC CATTCTCCTT
TCAGAATCCA ACCCGTATCG AGTTCGGTCT GGATAAAGAA AAGGAAATGG GTAAATACAT
GCACGAATAC GGCGCGAAGA AAGCGCTGAT CATCTATGGC AGCGAGCGTG TGAAACAATC
CGGCCTGTTC GAAGACGTTA CCAAGTCTCT GCGTGAACAC GGCATCGAGT ACATCGAATG
TGGCGGCGTT AAAAGCAACC CGACCATCAG CAAAGTCCGT GAAGCTGTTG CAATGGCCAA
AGCATTCGGC GCAGATAGCG TGCTGTCTAT TGGTGGTGGT AGCTGCCTGG ACAGCGCGAA
AGCGATCGCA GCCGGTGCGT GCTACGATGG CGATACTTGG GACTTCTTCA AGGGCACCCT
GGTTCAAAAG GCGCTGATGA TCTTCGATGT AATCACCCTG GCGGCTACGG GTTCCGAAAT
GAACTGGGGT AGCGTGATCA CCAACGAGGA AACCCAACAG AAATACTCCA TTCACAACAA
CCATCTGTTC CCTAAAGTTA GCGTAATCAA CCCGAAGCTG CAGGCGACTG TGTCTCGTGA
TTACCTGGTT TATTCTGCTG CCGATATCAT CGCACACTCT ATCGAAGCGT ATTTCACCGC
AGAATACCGC CCGGAGATCA TCGACTTTCT GGTAGAGAGC AACATCAAAA CTGTCATCCG
TACCACGGAA ATCCTGCTGA ACGACCCGCA GGATCTGAAC GCGCGCGGCG AATTTGCATG
GGCCGCTACG CTGGCACTGA ATGGCCTGAC CCACCTGGGT ATCAGCCCGT ACGGCTTTCC
GAACCACATG ATCGAACACA GCATGTCTGC GATTAGCGAC GTTCCGCACG GTGCAGGTCT
GAGCGTGATC ATGCCGGCGT GGATGCAGTG GTATCAGAGC CAGCGTCCGG CGCAGTTCAA
ACGTTTTGCC AAAGAAATCT TCGGTCTGGA GAACGCGGAA GAGGGTATCC AGGCGCTGAA
AACTTGGTTC GACAAAATTG GTACTCCAAC GCGTCTGGAA CAGCTGGGTA TTGACGACAA
AACCCTGTTT GAAATTGTTG ATAATGCAGT TCAGACTGCC ATCCGTGCCA AAGTTGAAAA
AACCTACACC AAAGAGGCGA TTAAAGCGAT CTTCGCCCTG GCAAAATAAA CTAGTAGAGA
CCGATACA

ADH19 (Accession No. G5IQ05_9ENTE)

GATACAGGTC TCGTCTAGAA TAAGAGCATA CAGGGGGCCT ATTATGCAGA ACTTCCGTTT
TTACGTTCCG ACCGACATTC GTTTTGGCAC GGACCGTCTG AGCGAACTGC CAGAAGCGCT
GTCCAGCATC GGCAAACGCG TTCTGCTGGT ATACGGCGGC GGCTCTATCA AAAAGAGCGG
TCTGTATGAT AAAGTCCAGC AGCAGCTGGT TAAGGGCGGT TTCGAAGTCG TAGAACTGAG
CGGTATCGAA CCGAATCCGA AAATTCACAG CGTTCGTTCC GGTGTTAAAC TGATCCGCAA
ACACCAGCTG GAAGTAATCC TGGCGATCGG TGGTGGCAGC GTGATCGATA CTGCTAAAGT
AATCGCGGCT GGCGTATTCT ATGAAGGCGA CCCGTGGGAC CTGGTTGTCG ACAGCAGCAA
AATCAAACAA GCTCTGCCGA TCGTTGACAT CCTGACCCTG GCGGCAACCG GCACCGAAAT
GAACCGCAAT GCGGTGATTT CTAACGCTGA TACCAAAGAA AAACTGGGTA CCGGCGGCGC
TGAACTGCTG CCGCACGTTT CTTTTCTGGA CCCTACCACC ACTTTCTCCG TTTCCAAATG
GCAGACCGCG GCTGGTGCGG CAGATATCCT GTCCCACCTG TTCGAACAGT ACTTCAACCG
TACCAAAGCT GTCCAAGTTC AAGACAACAT TGCGGAAGCC CTGATGAAGG TAGTAATCGA
TTTCGCTCCG GTGGCCTTTG AAAATCCTGA CGACTATGGC GCACGTGCGA ACCTGCTGTG
GGCTAGCACC CTGGCTCTGA ACGGCCTGGT TGGCAACGGT CGCTCCGGTG GCTGGACTTG
CCACCCGATC GAACATGAGC TGTCTGCTTT CTATGATATC ACTCATGGCA TTGGTCTGGC
TATCCTGACC CCGCGCTGGA TGGCTTACTG TATCACCCAC GACCCAAGCA CCCATGAGAA
ATTCGCTAAG TATGGTGAAG CTGTGTGGGG CCTGACGGGT GACTCCCAGG CAGAAATCGC
TCGTAAGGCG GTACGTACTA CTTACGAATT TTTCGAAGAC CAGCTGGAAA TTCCGATGAC
CCTGCAGAAA GTGGGTATCG AAACGACGGA ACTGGTGGAC GAAATGTCTC AGCAGGCGGT
GGTGCATGGC GAGCTGAACA CTGACGGCCC GTTCGTTCGC CTGGACGAAG AAGCGGTTAA
AAGCATCATT ACCAGCTGTT TCGAAGAAAT GACTCTGAAC TAAACTAGTA GAGACCGATA
CA

ADH20 (Accession No. B2V5D0_CLOBA)

GATACAGGTC TCGTCTAGAC ATAAAGCTCA GAGGACATCA CACATGGAAA ATTTCAACTA
CTCTATTCCG ACCGAAATCT ATTTCGGTAA GGGTCAGATC AAAAACCTGG GTAATGCCAT
CAAAAAGTAC GGTAGCAAAG TGCTGGTTGT GTATGGCGGC GGTAGCATCA AACGTATCGG
CCTGTACGAC GACATGATGA AAATCCTGAA AGACAACAAC ATCTCTTACG TTGAACTGTC
CAACATCGCA CCAAACCCGC GCATCGAATC TGTGCGTGAC GGCGTGAAAC TGTGCCGTGA
TAACGACGTT GAAGTCGTTC TGGCAGTCGG TGGCGGCAGC ACGATCGACT GCGCTAAAGT
AATCGCAGCA GGTGTAAACT ATGACAAAGA CCCGTGGGAC CTGGTTCTGG ACAGCTCTAA
AATGACCACG GTTCTGCCAG TTATCACTAT TCTGACCCTG AGCGCAACCG GTTCTGAAAT
GGACCCATTC GCAGTGATCT CTGACATGAG CAAAAACGAA AAGGTAGGCG TGGGTAACGA
TAAAATGAAA CCGAAAGTGT CTATCCTGGA CCCGGAATAC ACCTACAGCG TTCCGAAAAA
CCAAACCGCG GCGGGCACGG CTGATATCAT GTCCCACATC TTCGAAAACT ACTTCAACAA
CACGAAAGGC GCCTTTATCC AGGCACGCAC TGCTGAAGGT CTGCTGAAAG CTTGTATGAA
ATATGGCAAG ATCGCCATCG AGGAACCAAA CAACTACGAA GCTCGTGCAA ACCTGATGTG
GGCATCCAGC CTGGCCATTA ACGGCCTGAT CTCTTACGGC ACCGCGGGTG CGTGGAGCGT
CCACCCGATG GAACACGAAC TGTCTGCATT CTACGACATT ACGCATGGTG TCGGTCTGGC
GATCCTGACC CCGCATTGGA TGCGCTACGT CCTGAACGAA GATACTCTGG ACAAATTCGT
TGAATATGGC ATTAACGTGT GGGAGCTGGA CAAAAACCTG GACAAATATA CCATCGCGAA
CACTGCGATC GATAAAACGG CAGAATTTTT CAAGGAAATG GGTATTCCGA GCACTCTGCG
CGAAGTGGGT ATTGGCGAGG AGAACTTCAA AATCATGGCG CAAAAAGCGG TTAAAAGCGG
CCTGGAATAC GGTTTCAAAC CGCTGGCTCC GGAAGATGTG GTTAACATCT ACAAAGCTGC
TCTGTAAACT AGTAGAGACC GATACA

ADH21 (Accession No. E2SME8_9FIRM)

GATACAGGTC TCGTCTAGAA ACACACGACG GGGAGGGGAC GCAATGACCG AAGCGATGGA
AAACTTCATT TACGATATCC CGACCAAAGT TTACTTTGGC AAAGGTCAGC TGAACCAGCT
GGCAGATATC GTGCAGGTCT ATGGCCAGCG TGTTCTGCTG GTTTATGGTG GCGGTTCCAT
TCAACGTAAC GGCATTTATG ACGCAGCAGT TGCACAACTG AAAAAGGCGG GTAAGAAGTA
CACCGAACTG TCTGGTGTTG AACCGAATCC GTCCATCCAC ACGGTCGAAA AAGGTGTTAT
GCTGTGCCAG CGTGAACAGA TCGACATGCT GGTAGCTATT GGTGGCGGCA GCGCTATCGA
TTGTGCCAAG GTGATCAGCG CCGCCGCCTG CTCCACCCGT CGTCCGTGGG AACTGGTTAC
GCACCCAGAG GAAATTCAGC GCGCGCTGCC GGTTATCGCC GTTCTGACCA TCGCTGCAAC
CGGTAGCGAA ATGGATCACA TTGCTGTGAT CACGAATCCG CAAACCAAAG AGAAAATTGG
CACCCGTCAC CCGCTGCTGC GTCCGAAAGC CGCTATCCTG GATCCGAGCT TCACTTTCTC
TGTTAACGCT TACCAAAGCG CCTGTGGCGT GGCTGACATC ATGTCTCATA CGATGGAGTC
CTATTTTGCC CGTAAAGAAG CAGCCCTGCA AGATCGTTTC GCAGAGGGTA TTCTGAAGAT
CTGCCTGACC TACGGCCCGA TCGTGCTGCA GCAGCCGGAT AATTACGAGG CGCGTAGCAA
CCTGATGTGG GCAGCTTCTT GGGCTATCAA CGATCTGCTG AAACTGGGTC ACATGACTCA
GTGGTCCGTG CACCCGATGG AACACCCGCT GAGCGCGTTC TACAGCGTTA CTCACGGCGA
AGGTCTGGCG ATTCTGACCC CGCATTGGAT GGATTACGTC CTGTCTGAAG CTACCGTTGG
TAAATTCGCG TGTTTCGCTC GCGAAGTATG GCAGGTTCGT GAAATGGATC CATGGGACAT
GGCTCGTGAG GGCATCGAAC GCCTGCGTGG TTTCTACAAA CAGCTGCAGC TGCGCAGCAG
CCTGGGCGAA CTGGGCATCG ACGAAACCCA CTTTGACGCT ATGGCAGCAG ACGCAGCCAA
ACAAACCGTT AACGGTTACG TTGCACTGCT GGCAGAAGAT GTCAAGAACA TCTACCGTAA
CTCCCTGTAA ACTAGTAGAG ACCGATACA

ADH22 (Accession No. B0NYL0_9CLOT)

GATACAGGTC TCGTCTAGAT TAAAATCCTC CAGAGGTCAA TCCATGAATA ACTTCACCTA
CAGCATCCCG ACTAAGATTC ACTTCGGCAA AGGTCAGATC TCCCACCTGT CTGAGCTGTC
CGAGTCTGGC AACAAAGTTC TGCTGTGCTA TGGCGGCGGC AGCATCAAGA AAGCGGGCAT
CTATGACGAA GCCGTGAAAA TCCTGAAAGA AGAAGATATG GAAATCTTCG AACTGTCTGG
TATTGCACCG AACCCGAAAA TCGAAAGCGT ACGTGAGGGT GTGAAACTGT GCAAGGAGAA
CTCCATTGAT ATGGTTCTGG CTATCGGCGG CGGCTCCGTA ATCGATTGTG CTAAAGTCGT
AGCCGCTGGT GCCTGTTATG ACGGCGACCC GTGGGACCTG GTTATTACCC CGCGTTGGAT
CAAAAAGGCA CTGCCGATTT ACTCCGTACT GACTCTGAGC GCGACCGGCT CCGAGATGGA
TAAATTCGCA GTAATCTCTG ACATGTCTAA AAACGAAAAA TGGGGTACTG CGTCTGATCA
CATGAAGCCG AAAATGTCTA TTCTGGACCC GGAATACACG TATTCTGTTA GCAAAAAACA

AACTGCCGCG GGTACCGCGG ATATCATCTC TCATATCTGC GAAAACTACT TCACGAACGT
TAAAAACGCA GATGTGCAGG CTCGCTTCGC GGAAGGTCTG CTGAAAAATT GCTTTAAGTA
TGGCCCGGTT GCCCTGGAAG AACCGGATAA TTATGACGCT CGTGCGAACC TGATGTGGAC
CGCATCTATG GCGATTAACG GTATGATTCA GTACGGCGCT GAAGTGGCGT GGTGTGTACA
TCCGATGGAA CATGAACTGT CCGCGTTCTA TGATATCACC CACGGTGAAG GTCTGGCAAT
TCTGACCCCG CATTGGATGG AGTTTGCGCT GAACGATGAT ACCGCTTATA AATTCGCTGA
TTACGCACGC AACGTTTGGG ACGTTGTTAA CGACGACGAC ATGGCCGCAG CAAAAGAGGG
TATCGCGTAC ACTCGCGAAT ACTTTAAAAA GATGGGTCTG CCGCAGACCC TGACCGACGT
GGGTATCGAT AAAGAATATT TCGACATCAT GGCTCAGAAA GCTGCGGATG GCTGCAAGGG
CAGCTTCGTG CCACTGAGCA AAGAAGACAT CGTTTCCATC TATGAAGCTG CCCTGTAAAC
TAGTAGAGAC CGATACA

E2. Secondary ADH sequences

sADH1 (Accession No. KGK36767.1)

ATGTTCATGA AAGGTCTGAC GTATCTGAAG CCGGGCATTG TATCCTGGCA AAGCATCCCG
AAACCGGTTC TGAAAAAACC GACTGACGTG ATTGGTAAAG TTGTCACCAC TACCATCTGC
GGCTCCGACC TGCACATTCT GAAAGGTGAT GTTCCTGAGA CCACCGCGCT GGCGGCCACT
ACGGGTCATG GTGTGGTCCT GGGCCACGAA GCCATCATCG AAATTGAATC TGTAGGCGAC
GCTGTGAAAA ACTTTAGCAA AGGCGACGTT TGTATCGTAT CCTGCATCAC CTCTTGTGGT
AAATGCTACT ACTGCAAACG CAACCTGCAG TCTCACTGTA CCGGCCACAT GGAAGGCACT
TCCGGTTGGG TGTTCGGTCA TGAAATCGAT GGCACCCAGG CCGAATACGT GCGTGTTCCG
TGCGCTGATT ATGGCCTGTA CAAGGTTCCT GAAGGCGTTG CGTACGAAAA ACTGCTGATG
CTGTCCGACG CCATTCCAAC CTCCTACGAA ATCGGCATCC TGAATGGCGA GGTGAAGGAA
GGCGACTCCG TTGCTGTTGT CGGCCTGGGT CCGGTAGGTC TGAGCGCACT GCTGACCGCA
ATTAACAAAA AACCGAAACA ACTGATCGCA ATCGACATGG ACGAGAACCG TCTGGACCTG
GCTAAGCAGC TGGGTGCGAC GCATATCATC AACTCCACCA ACATGCCGAA CGAAGAGGTC
GCGAAGAAAG TGCAGGAGAT CAGCAAAGAC CTGGAACCGG GCCGTGAATC CGGCGTGGAC
GTCGCTATTG AATGTGTGGG CGTCCCTCCG ACCTTCGAGC TGTGTGAAGA CCTGATCGCA
TCTGGTGGCA CTATTGCTAA CGTGGGCGTC CACGGTGCGA AAGTAGACCT GAAACTGCAA
GAACTGTGGA TCAAGAACTG TAAGATTACC ACGGGTCTGG TGAGCACCTA CTCCATCCCG
GACCTGCTGA ACCAGGTTGC AGACGGTTCC CTGGACCCTA GCCCAATCAT TACCCATCAC
TTCAAATTTG ACGAATTCGA GAAAGCTTAC CAGGTTTTCA AAGACGCTAA AAATACCAAA
GCGATGAAAA TTATTCTGAC GCCG

sADH2 (Accession No. WP_011011186.1)

ATGTCTAAGA ACTACAAAAA GCACCAGGCA TATATCGCAG GTCGCGACAA AATGAAAGTT
GCTGTTATTA CTGGTGCTTC TCGTGGCATC GGCGAAGCTA TTGCTAAAGC CCTGGCGGAA
GATGGCTACT CTCTGGCGCT GGGTGCGCGC TCCGTTGACC GTCTGGAAAA AATCGCAAAA
GAGCTGAGCG AGAAACACGG TGTGGAAGTC TTTTACGATT ATCTGGACGT GTCCAAACCG
GAATCTGTAG AAGAATTTGC ACGCAAAACG CTGGCACACT TCGGTGACGT TGATGTTGTT
GTGGCGAACG CCGGTCTGGG TTATTTCGGT CGCCTGGAAG AGCTGACCGA AGAACAGTTC
CACGAAATGA TCGAAGTTAA CCTGCTGGGC GTTTGGCGTA CCATCAAAGC ATTCCTGAAC
TCCCTGAAAC GTACTGGTGG CGTTGCGATC GTCGTTACCT CCGATGTCTC CGCTCGTCTG
CTGCCGTACG GCGGCGGTTA TGTCGCAACG AAATGGGCAG CTCGCGCGCT GGTACGCACG
TTCCAGATCG AAAACCCTGA CGTGCGTTTC TTCGAACTGC GTCCGGGTGC TGTTGACACC
TACTTCGGCG GTAGCAAAGC CGGCAAACCG AAGGAGCAGG GCTACCTGAA ACCGGAAGAA
GTTGCGGAAG CAGTTAAATA CCTGCTGCGT CTGCCGAAGG ACGTTCGTGT TGAGGAGCTG
ATGCTGCGCT CTATTTACCA GAAACCGGAA TAC

sADH3 (Accession No. WP_011614641.1)

ATGAAAATCT CTCTGACTTC CGCACGTCAG CTGGCCCGTG ATATCCTGGC CGCGCAGCAG
GTGCCGGCCG ATATCGCGGA CGACGTGGCT GAACATCTGG TTGAATCTGA CCGTTGTGGC
TATATCTCCC ACGGCCTGTC TATCCTGCCG AACTATCGTA CTGCGCTGGA CGGCCACTCT

GTTAACCCGC AAGGTCGTGC AAAATGTGTG CTGGATCAGG GTACCCTGAT GGTCTTCGAC
GGCGATGGTG GTTTTGGTCA ACACGTAGGC AAATCTGTTA TGCAGGCTGC GATTGAACGC
GTTCGTCAGC ACGGTCACTG TATCGTTACC CTGCGTCGTT CCCACCACCT GGGTCGCATG
GGCCACTACG GCGAAATGGC AGCTGCTGCG GGCTTTGTTC TGCTGTCCTT CACCAATGTG
ATCAACCGTG CGCCAGTTGT GGCGCCGTTC GGCGGTCGTG TTGCCCGTCT GACTACTAAC
CCGCTGTGCT TTGCTGGCCC GATGCCAAAC GGCCGCCCGC CTCTGGTAGT TGACATCGCA
ACCAGCGCCA TCGCCATCAA CAAAGCTCGC GTTCTGGCCG AAAAAGGCGA ACCAGCACCA
GAAGGCTCTA TCATCGGTGC GGATGGTAAC CCGACCACCG ATGCCTCTAC CATGTTTGGT
GAACACCCGG GTGCTCTGCT GCCATTCGGT GGTCACAAAG GTTATGCACT GGGTGTTGTA
GCTGAACTGC TGGCAGGTGT GCTGAGCGGC GGCGGTACGA TCCAGCCGGA CAACCCGCGT
GGCGGTGTGG CGACTAACAA CCTGTTCGCT GTTCTGCTGA ACCCGGCGCT GGATCTGGGC
CTGGACTGGC AGAGCGCTGA AGTTGAGGCT TTCGTTCGTT ACCTGCATGA TACCCCGCCG
GCCCCGGGTG TTGACCGTGT TCAGTACCCG GGCGAATATG AAGCAGCGAA CCGTGCGCAG
GCTTCCGACA CGCTGAACAT CAACCCGGCG ATCTGGCGCA ACCTGGAGCG CCTGGCGCAG
TCTCTGAACG TCGCAGTACC GACCGCT

sADH4 (Accession No. P14941.1)

ATGAAGGGTT TCGCTATGCT GTCCATCGGC AAGGTGGGCT GGATTGAAAA AGAGAAACCG
GCGCCTGGTC CGTTCGACGC CATTGTTCGC CCGCTGGCCG TAGCGCCGTG TACCTCTGAT
ATCCACACTG TGTTCGAGGG TGCGATTGGC GAACGCCACA ACATGATCCT GGGCCACGAG
GCGGTCGGCG AAGTAGTGGA AGTTGGTAGC GAGGTAAAGG ATTTCAAACC GGGCGATCGC
GTCGTTGTGC CGGCAATCAC TCCGGATTGG CGTACTAGCG AAGTACAGCG CGGTTACCAT
CAGCACAGCG GCGGCATGCT GGCGGGCTGG AAATTCAGCA ATGTTAAAGA CGGTGTTTTC
GGTGAATTTT TCCACGTGAA CGACGCCGAT ATGAACCTGG CGCACCTGCC GAAAGAAATT
CCGCTGGAAG CAGCGGTTAT GATCCCGGAC ATGATGACTA CTGGCTTCCA CGGTGCTGAA
CTGGCTGATA TTGAACTGGG TGCGACCGTA GCAGTACTGG GCATCGGTCC GGTGGGCCTG
ATGGCAGTGG CCGGCGCTAA ACTGCGTGGT GCGGGTCGCA TCATCGCCGT TGGCTCCCGC
CCGGTGTGCG TCGACGCTGC GAAATACTAT GGCGCGACGG ATATTGTTAA CTACAAAGAC
GGCCCGATTG AATCTCAGAT CATGAACCTG ACTGAAGGTA AAGGTGTTGA CGCTGCTATC
ATCGCCGGCG GCAATGCAGA CATCATGGCG ACTGCCGTGA AAATTGTGAA ACCGGGTGGT
ACCATCGCGA ACGTTAACTA TTTCGGTGAG GGTGAAGTTC TGCCAGTACC GCGTCTGGAG
TGGGGTTGTG GCATGGCCCA TAAAACCATC AAAGGTGGCC TGTGTCCGGG CGGTCGTCTG
CGCATGGAAC GTCTGATTGA CCTGGTCTTC TATAAACGTG TGGACCCGTC TAAACTGGTC
ACCCACGTAT TCCGTGGCTT CGATAACATT GAAAAAGCTT TCATGCTGAT GAAAGACAAA
CCGAAAGACC TGATTAAGCC GGTAGTCATC CTGGCG

sADH5 (Accession No. AAA23199.2)

ATGAAAGGCT TCGCTATGCT GGGTATCAAC AAACTGGGTT GGATCGAAAA GGAACGTCCG
GTGGCAGGCT CTTACGATGC TATTGTTCGT CCACTGGCTG TCTCTCCGTG CACCTCCGAT
ATCCACACTG TCTTTGAGGG CGCGCTGGGT GATCGTAAAA ACATGATCCT GGGCCACGAA
GCAGTCGGCG AGGTCGTTGA AGTTGGTTCT GAGGTGAAAG ACTTCAAACC AGGCGATCGT
GTTATCGTTC CGTGTACCAC CCCGGACTGG CGCTCTCTGG AAGTACAAGC AGGCTTCCAG
CAGCATAGCA ATGGTATGCT GGCAGGCTGG AAGTTCAGCA ACTTTAAGGA CGGTGTGTTC
GGCGAATACT TCCACGTTAA CGACGCAGAT ATGAACCTGG CGATCCTGCC GAAAGATATG
CCGCTGGAAA ACGCGGTTAT GATCACCGAC ATGATGACTA CCGGCTTCCA CGGTGCAGAG
CTGGCTGACA TCCAAATGGG TTCTTCTGTC GTGGTGATCG GCATCGGCGC TGTTGGCCTG
ATGGGCATCG CTGGCGCTAA GCTGCGCGGC GCCGGCCGTA TTATCGGCGT TGGCAGCCGT
CCGATCTGCG TGGAAGCTGC TAAATTCTAT GGCGCCACCG ACATTCTGAA CTACAAAAAT
GGTCACATCG TGGATCAGGT GATGAAACTG ACCAACGGTA AAGGTGTAGA CCGTGTAATC
ATGGCAGGTG GTGGTTCTGA AACCCTGAGC CAGGCGGTAT CTATGGTGAA ACCGGGTGGC
ATCATCTCCA ACATCAACTA TCACGGCTCT GGCGATGCGC TGCTGATCCC GCGTGTGGAG
TGGGGTTGCG GTATGGCTCA TAAAACCATC AAGGGCGGCC TGTGTCCGGG CGGTCGTCTG
CGCGCAGAAA TGCTGCGCGA TATGGTGGTA TATAACCGTG TAGACCTGAG CAAGCTGGTT
ACCCATGTTT ATCACGGTTT CGACCACATC GAGGAAGCCC TGCTGCTGAT GAAAGACAAA
CCTAAAGATC TGATCAAAGC TGTTGTAATT CTG

sADH6 (Accession No. XP_455102.1)

ATGCGCGCAC TGGCTTATTT CGGCAAGCAG GATATCCGTT ACACCAAGGA TCTGGAAGAA
CCGGTTATCG AGACCGACGA CGGCATCGAA ATTGAAGTCA GCTGGTGCGG TATCTGTGGC
TCCGACCTGC ACGAATATCT GGATGGTCCG ATTTTTTTCC CTGAAGATGG TAAAGTGCAT
GACGTTAGCG GTCTGGGCCT GCCACAGGCG ATGGGTCACG AGATGTCTGG CATCGTATCT
AAAGTGGGCC CGAAAGTTAC CAACATCAAA GCTGGTGACC ACGTGGTCGT CGAGGCAACT
GGCACTTGTC TGGATCATTA CACCTGGCCG AACGCGGCTC ATGCGAAAGA TGCTGAATGC
GCGGCGTGCC AGCGTGGCTT TTACAACTGC TGCGCCCACC TGGGTTTCAT GGGTCTGGGT
GTTCACAGCG GCGGTTTCGC GGAAAAAGTG GTGGTGAGCG AGAAACATGT TGTTAAGATC
CCGAACACCC TGCCGCTGGA CGTTGCAGCT CTGGTCGAAC CAATTTCTGT CTCCTGGCAC
GCGGTTCGTA TCAGCAAGCT GCAAAAAGGC CAATCTGCTC TGGTGCTGGG CGCTGGCCCA
ATTGGCCTGG CCACCATCCT GGCGCTGCAG GGTCACGGTG CAAGCAAAAT CGTTGTATCC
GAACCAGCGG AAATCCGTCG CAATCAAGCA GCAAAACTGG GCGTTGAAAC GTTCGATCCG
TCCGAACACA AAGAAGACGC GGTTAACATC CTGAAGAAAC TGGCACCGGG TGGTGAGGGT
TTCGATTTCG CCTACGACTG TAGCGGTGTC AAACCTACCT TTGATACTGG TGTACACGCT
ACCACCTTCC GCGGTATGTA CGTGAACATC GCAATTTGGG GTCATAAACC GATCGATTTC
AAACCGATGG ACGTGACTCT GCAGGAGAAG TTCGTCACGG GTTCCATGTG CTACACCATT
AAGGATTTCG AAGATGTGGT TCAGGCTCTG GGTAACGGCT CCATCGCCAT CGACAAGGCG
CGCCACCTGA TTACTGGCCG CCAGAAAATT GAAGATGGCT TCACCAAAGG CTTCGACGAA
CTGATGAACC ATAAAGAAAA AAACATCAAG ATCCTGCTGA CTCCTAATAA CCACGGCGAA
CTGGACGCGA CCAAC

sADH7 (Accession No. AAP39869.1)

ATGAAAGCAG CCGTGTTCAA AGGTAAGAAC CGTATCGTAC TGGATGAAAA GCCGGTGCCG
GTGCCAAAAC ATAGCGAAGC GCTGATTAAA ATCACTACCA CTACCATCTG CGGTACCGAC
ATTCACATCC TGAAGGGCGA ATACCCGGTA GCGGAAGGCC TGACCATTGG CCACGAACCG
ATCGGTGTGA TTGAGAGCTT CGGCGACGGT GTTACCGGCT TCAAGAAAGG CCAGCGTGTT
GTTATTGGCG CTATCACGCC GTGCAGCTCT TGTAGCAGCT GTATGGAAGG CATCCGTTCT
CAGTGTGGCA GCAAACTGAT GGGCGGCTGG AAATTCGGTA ATACCATCGA TGGCTCTCAG
GCGGAATATC TGATCGTGCC GGACGCTGCA GCGAACATGT ACCCTATTCC GGATGGTATT
ACCGATGAAC AGGTGCTGAT GTGTCCGGAC ATTATGTCCA CTGGTTTCTC CGGTCCAGAA
TCTGCCGGTG TGAAAGTGGG TGACACCGTC GTTATTTATG CTCAGGGTCC GATCGGTCTG
GGCGCTACCG CGGGTGCCAA AATGATGGGC GCAACGAAAG TAATTGTTGT AGATCGTTTC
CCGGAGCGTC TGGCGCTGGC AAAAAAGCTG GGCGCGGATT ATACGCTGGA TTTCACCAAA
TGTAACCCTA TTGAAGAAGT GATGCGTCTG ACTGGTGGTC GTGGCGTTGA CGTTGCAATT
GAAGCGCTGG GTCTGCAGTC CACCTTTGAG TCTTGCCTGC GTTGCCTGAA ACCGGGCGGT
GTGCTGAGCA GCCTGGGTGT CTATTCTGAT GACCTGCGTC TGCCGAACGA CGCTTTCGCT
GCGGGCCTGG GCGACTTCAA GATCGTTACT ACCCTGTGTC CTGGCGGCAA AGAGCGTATG
CGTCGTCTGC TGTCTGTAAT CGAGTCTGGC CGTGTTGACA TGCGCCCGAT GGTGACTCAC
ACCTTTAAGC TGGATGAAAT CGAAAAAGCC TACGACCTGT TCGGTAACCA GCGCGATGGC
GTTCTGAAAG TAGCCATCAA GCCG

sADH8 (Accession No. Q0KDL6.1)

ATGACCGCGA TGATGAAGGC AGCGGTATTT GTTGAACCTG GTCGTATTGA ACTGGCGGAT
AAACCGATTC CGGATATCGG TCCGAACGAC GCACTGGTTC GCATTACCAC CACCACTATT
TGCGGCACCG ACGTTCACAT CCTGAAGGGC GAATATCCGG TTGCTAAGGG CCTGACCGTG
GGCCACGAGC CGGTTGGCAT CATCGAGAAA CTGGGCAGCG CAGTAACGGG CTATCGCGAA
GGTCAGCGTG TAATCGCAGG TGCGATCTGT CCTAACTTCA ACTCTTACGC GGCGCAGGAT
GGTGTTGCGT CTCAGGATGG CAGCTACCTG ATGGCTTCTG GCCAGTGCGG CTGTCATGGT
TACAAAGCAA CCGCCGGCTG GCGTTTCGGT AATATGATTG ACGGTACCCA GGCTGAATAT
GTTCTGGTAC CGGATGCGCA GGCCAACCTG ACCCCGATTC CGGACGGCCT GACGGACGAA
CAGGTCCTGA TGTGTCCGGA TATTATGTCC ACCGGTTTCA AAGGTGCGGA GAACGCAAAC
ATTCGCATTG GTGACACCGT TGCGGTGTTT GCGCAGGGTC CGATCGGTCT GTGCGCGACT
GCTGGTGCGC GTCTGTGCGG CGCAACTACT ATCATCGCTA TCGACGGCAA CGATCATCGT
CTGGAAATCG CGCGCAAAAT GGGTGCGGAC GTTGTGCTGA ACTTCCGTAA CTGCGACGTG

GTCGACGAGG TGATGAAACT GACCGGCGGT CGTGGTGTGG ATGCGTCTAT TGAAGCACTG
GGTACCCAGG CGACCTTCGA ACAATCTCTG CGTGTTCTGA AGCCGGGTGG TACGCTGTCT
TCTCTGGGTG TCTACTCCTC TGATCTGACT ATCCCGCTGA GCGCCTTCGC AGCCGGTCTG
GGCGACCACA AAATTAACAC CGCCCTGTGC CCGGGTGGCA AAGAACGTAT GCGTCGTCTG
ATTAACGTTA TCGAATCCGG TCGCGTGGAC CTGGGTGCGC TGGTAACCCA CCAGTATCGC
CTGGATGATA TCGTTGCGGC GTACGACCTG TTCGCTAACC AGCGTGATGG TGTTCTGAAA
ATCGCCATCA AACCGCAC

sADH9 (Accession No. XP_001580601.1)

ATGACCTTCG AACTGCCGAA AACTATGAAA GCGTTTGCGA TGCGCAAGAT CGGTGAAGTC
GGCTGGATTG AAAAGCCGGT GCCAGAATGC GGTCCGAACG ATGCAATCTG CCGTCCGCTG
GCTCTGGCTC CGTGCACCTC TGACATTCAC ACTGTGTGGG CGGGTGCGAT CGGTGAACGC
CATGACATGA TCCTGGGCCA TGAAGCCGTT GGCCAAGTTG TTAAAATCGG TTCCGAAGTT
AAAAACCTGA AAGTTGGCGA TAAGGTTCTG GTTCCGGCAG TAACTCCGGA TTGGGGTAGC
GAAGCAGCAC AGGAAGGCTT CCCGGCACAC TCCGGCGGTA TGCTGGGTGG TTGGAAATTT
TCCAACTTCA AAGATGGCGT TTTTGCTGAA TACTTCCACG TCAACGAAGC CGACGCTAAC
CTGGCCAAAC TGCCGGAAGG TCTGACGCCG CGTGATGTAA TCATGTGCAG CGACATGATG
ACTACCGGTT TCCATGGTGC AGAACTGGCG GAGGTTAAGC TGGGTGATAT CGTAGTAGTT
ATCGGTATCG GTCCGGTTGG TCTGATGTCT GTACGTGGCG CTGCTCTGAT GGGCGCAAGC
CGTATCTTCG CAGTCGGTTC CCGTCCGCAC TGCTGCGACA CCGCAGTCCA GTACGGTGCC
ACTGACATCA TCAACTATAA AAATGGTGAT ATCGTGGAAC AGATCCTGAA AGCTACTGGC
GGTAAAGGCG TTGATCGTGT GATTATCGCG GGTGGCGACG TCCATACTTT CGCGCAAGCT
ATTAAAATGA TCCGTGCTGG CGGCGTTATC GGCAACGTGA ACTACCTGGG CGAAGGTGAA
ATGATCGACG TACCGCGTGT AGAATGGGGT GTTGGCATGG GTCACAAATT CATCCACGGT
GGTCTGACCC CGGGTGGTGC ACTGCGTATG GAAAAAATGG CTAACCTGAT CAAGTATAAA
AAAGTCGATC CGACGAAACT GATTACCCAT GAATTCAAGG GTCTGGAAAA AGTTGAAGAT
GCTCTGATGC TGATGAAAGA CAAACCGGTT GACCTGATCA AACCGGTTGT TCTGATTGAA
TACAACGACA AACTG

sADH10 (Accession No. AJP52792.1)

ATGATGGCGA CCATGAAAGC AGCGATCTTT GTTGAAAAAA ACCGTATTGT TCTGGAAGAC
AAACCAATCC CGGAAGTTGG CCCGCTGGAT GCACTGATCC GTATCACCAC CACTACGATT
TGCGGCACCG ATGTTCACAT CCTGCGCGGT GAGTATCCGG TAGCGAAGGG TCTGACGATC
GGTCATGAAC CAGTAGGTAT TATCGAACGT CTGGGTTCCC AGGTTCGTGG TTTCGTAGAA
GGTCAGCGTG TTATTGCAGG CGCGATCACC CCGTCTGGCC AAAGCTACGC ATGCCTGTGT
GGCTGTGCCA GCCAGGACGG TCCGGATACC CGTCACGGTT TTCGTGCGAC CGGCGGCTGG
AAATTCGGCA ACATTATCGA CGGCTGCCAG GCGGAGTATG TACTGGTGCC AGACGCGCTG
GCGAACCTGT GCCCAATTCC GGATGGCCTG AGCGACGAAC AAGTTCTGAT GTGCCCGGAC
ATCATGTCCA CTGGTTTCTC TGGCGCAGAA CGTGGCGAAA TTAACATTGG TGATACTGTT
GCGGTATTCG CACTGGGTCC GATCGGCCTG TGTGCTGTGG CGGGCGCCCG TCTGAAGGGT
GCGACCACCA TCATCGGTGT GGACGCAGTG GCTCAGCGTA TGTCTGTTGC ACGTCAGCTG
GGCGCCACCC ACGTGGTAAA CTTCAAAGAG GCGAACGTTG TGGAACAGAT TATGGCGCTG
ACGGACGGCC GTGGTGTTGA TGTATCTATC GAAGCACTGG GCACCCAGGG CACCTTCGAA
TCTGCTCTGC GTGTCCTGCG CCCGGGCGGT CGCCTGTCCT CCCTGGGTGT TTATTCCAGC
GACCTGCGTA TCCCGCTGGA CGCCTTCGCC GCAGGCCTGG GCGATTACTC CATCGTCACT
ACCCTGTGTC CGGGTGGCAA AGAGCGTATG CGTCGCCTGA TGGCCGTAGT TCAGAGCGGC
GCGGTCGACC TGTCTCCGCT GGTCACTCAC CACTTCAAGC TGGATGACAT CGAAGCGGCA
TATGAACTGT TTGCGAACCA GCGTGATGGT GTAATGAAAG TTGCAATCAC CCCG

sADH11 (Accession No. WP_011835462.1)

ATGTCTAAAG TGGCTGCCGT GACCGGTGCA GGTCAGGGCA TTGGTTTTGC AATCGCGAAA
CGCCTGTATA ACGACGGTTT CAAAGTAGCC ATCATCGATT ACAACGAAGA AACCGCTCAG
CAGGCTGCGA AAGAACTGGG TGGTGAATCT TTCGCGCTGA AGGCGGATGT TTCTGACCGT
GACCAGGTAG TCGCCGCGCT GGAAGCTGTT GTTGAGAAAT TCGGTGATCT GAACGTGGTA
GTAAACAACG CGGGTATCGC CCCGACTACC CCGATCGAAA CGATCACCCC GGAACAGTTT

CACCAGGTGT ACAACATCAA TGTTGGTGGT GTGCTGTGGG GTACCCAGGC TGCTACTGCT
CTGTTCCGTA AACTGGGCCA CGGCGGTAAG ATTATCAACG CCACCTCCCA GGCTGGTGTG
GTCGGTAACC CGAACCTGAT GCTGTACAGC AGCTCCAAAT TCGCTGTCCG CGGCATGACC
CAGATCGCAG CACGTGACCT GGCAGAAGAG GGTATCACCG TCAACGCCTA CGCTCCAGGC
ATTGTGAAAA CCCCGATGAT GTTCGATATC GCTCATCAGG TGGGTAAGAA CGCCGGCAAA
GACGACGAGT GGGGTATGCA GACCTTCGCT AAAGACATCG CGATGAAACG TCTGAGCGAG
CCGGAAGATG TAGCAAACGT TGTTTCCTTT CTGGCCGGCC CGGATTCCAA CTACATCACC
GGCCAGACTA TCATTGTAGA CGGTGGCATG CAATTTCAT

sADH12 (Accession No. AAC04974.1)

ATGCGTGCGC TGGCCTATTT CAAGAAAGGT GACATTCACT TCACTAATGA CATCCCACGT
CCGGAAATCC AGACGGACGA CGAAGTTATC ATCGATGTGT CTTGGTGCGG CATCTGTGGT
TCTGACCTGC ACGAATACCT GGATGGCCCG ATCTTTATGC CGAAAGACGG TGAGTGCCAC
AAACTGAGCA ACGCCGCTCT GCCTCTGGCT ATGGGCCACG AAATGAGCGG TATCGTTTCC
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AGCTCCTGCG CCGACCTGCA CTGCTGGCCG CACTCCAAAT TTTATAACTC TAAGCCGTGT
GACGCATGTC AGCGTGGTTC CGAAAACCTG TGCACCCACG CGGGCTTTGT AGGTCTGGGC
GTCATTAGCG GTGGCTTCGC GGAGCAGGTA GTTGTATCTC AACACCACAT CATCCCGGTT
CCGAAGGAGA TCCCGCTGGA CGTTGCAGCT CTGGTTGAAC CGCTGAGCGT TACTTGGCAT
GCAGTGAAAA TTTCTGGTTT CAAAAAAGGT TCTTCCGCAC TGGTTCTGGG CGCAGGTCCG
ATCGGTCTGT GCACCATCCT GGTTCTGAAA GGCATGGGTG CATCCAAGAT TGTCGTATCC
GAAATTGCGG AGCGCCGTAT TGAAATGGCG AAAAAGCTGG GTGTTGAAGT ATTCAACCCG
TCTAAACACG GCCACAAATC CATTGAGATC CTGCGTGGCC TGACCAAAAG CCATGATGGC
TTTGACTACA GCTATGATTG CTCTGGCATC CAGGTGACTT TCGAAACTTC TCTGAAAGCG
CTGACTTTCA AAGGTACCGC TACCAACATT GCAGTGTGGG GCCCGAAACC GGTTCCATTC
CAGCCGATGG ATGTCACCCT GCAGGAAAAA GTAATGACCG GCTCCATTGG TTACGTTGTG
GAAGATTTCG AAGAAGTTGT GCGTGCTATT CATAACGGCG ATATTGCTAT GGAAGATTGT
AAGCAGCTGA TCACCGGTAA ACAGCGTATC GAAGATGGTT GGGAGAAAGG CTTTCAGGAA
CTGATGGATC ACAAAGAATC TAACGTAAAA ATTCTGCTGA CTCCAAACAA CCACGGTGAA
ATGAAA

sADH13 (Accession No. WP_000374004.1)

ATGGATCGTA TCATTCAGTC TCCTGGCAAA TACATCCAGG GCGCAGATGT GATCAACCGT
CTGGGTGAAT ATCTGAAACC GCTGGCAGAG CGTTGGCTGG TGGTTGGCGA TAAATTCGTG
CTGGGCTTTG CTCAGTCTAC CGTGGAAAAA TCCTTCAAGG ATGCGGGCCT GGTGGTTGAA
ATTGCACCGT TCGGCGGTGA ATGTAGCCAC AACGAAATTG ACCGTCTGCG TGGCATCGCT
GAAACTGCCC AATGTGGCGC GATTCTGGGC ATCGGTGGCG GCAAGACCCT GGACACTGCC
AAAGCGCTGG CGCATTTCAT GGGTGTCCCA GTTGCGATCG CTCCGACCAT CGCGTCTACC
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GCGTGCTCCC GTTCTGGTGC GACGACCATG GCTGGCTGCA AATGCACCCA GGCAGCGCTG
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GCGGAACAGC ACGTCGTAAC CCCTGCTCTG GAACGTGTAA TTGAAGCAAA TACTTACCTG
AGCGGCGTGG GTTTCGAATC CGGTGGCCTG GCGGCTGCGC ACGCTGTTCA TAACGGCCTG
ACCGCGATCC CTGACGCGCA CCACTACTAT CACGGCGAGA AAGTGGCTTT CGGCACCCTG
ACTCAACTGG TACTGGAAAA CGCGCCGGTC CAGGAAATCG AAACCGTGGC GGCGCTGTCC
CATGCAGTAG GCCTGCCGAT CACCCTGACC CAGCTGGACA TCAAAGAAGA CGTGCCAGCA
AAAATGCGTA TCGTGGCCGA AGCGGCATGC GCAGAAGGTG AGACCATCCA TAACATGCCG
GGCGGCGCTA CCCCGGATCA GGTCTACGCC GCCCTGCTGG TAGCAGACCA ATATGGCCAG
CGTTTTCTGC AGGAATGGGA ATAA

sADH14 (Accession No. BAD32689.1)

ATGATGAAAG CGCTGTGTTA CCTGGGTTCT AAAACTATCA AATGGCAGAC CGTAGCCAAA
CCGACCCTGA AATCCCCAAC CGACGTTATC GGTAAACTGT CTGCACTGAC CCTGTGTGGC

TCTGATCTGC ACATTATTGC GGGTCACGTA AAAGAAAGCA CCGATATCGC CGAGTCCCAG
CCGGGCCGTG GCCTGATCCT GGGTCACGAA GGTATCATCA AAGTGGAAGA GGTAGGCGAT
GCTGTCAAAA ACTTCAAACG TGGTGACGTT TGCATCGTCT CTTGCATCAC CAGCTGCGGT
GAATGCTACT ACTGCAAACG TGATCTGCAG TCCCATTGCA ACCGTACCGA AGGTACCTCC
GGCTGGATCC TGGGCCACGA AATTGATGGT ACCCAGGCCG AATACGTCCG TATCCCGTAC
GCCGACCAGT CTCTGTACAA AGCTCCGGAG AACGTGCCGA TCGAGAGCCT GCTGATGCTG
AGCGACATCC TGCCGACCGC GTACGAAGTG GGCGTTGTCT CTGGCAATGT GAAAAAAGGT
GATACCGTCG CCATCGTAGG TCTGGGCCCT GTTGGCCTGT CCGCGCTGCT GTCCGCTAAA
GCCCTGGACC CGGCTAAAAT CATTGCAATT GATATGGACG ACTCTCGTCT GGAGGTTGCA
CGTCGTCTGG GTGCGCACGA AACTATCAAT CCGGGCAAAC AGGATGCTGC AAAGCTGGTT
CATGAACTGA CCGCGAGCGA AGGTAAGTCT TCTGGTGTAG ACGTTGCAAT CGAATGTGTT
GGCGTGCCGG CCACCTTTGA AATGTGCGAA GACCTGCTGT GTCCGGGTGG CCACCTGTCT
AACGTTGGCG TTCACGGTTC TAGCGTCGAA CTGAAACTGC AGGAGCTGTG GATCAAAAAC
ATTTCTATCA GCACCGGTCT GGTATCTGCT TATTCCACCG AAACCCTGCT GCAGAAAGTT
ATCGACAAAA AACTGGACCC GACCCCTCTG GCAACCCACC ATTTCAAGCT GAGCGAAATC
GAAAAGGCGT ACGATGTCTT CTCTCACGCC GCAGATAACC AGGCCATCAA AATGGTGATC
ACCTGTGACG AA

sADH15 (Accession No. BAA24528.1)

ATGAGCATTC CGTCCAGCCA GTACGGCTTC GTGTTCAACA AACAGTCCGG CCTGAACCTG
CGCAACGATC TGCCTGTTCA TAAACCGAAG GCGGGTCAGC TGCTGCTGAA AGTTGATGCT
GTTGGTCTGT GCCATTCCGA TCTGCACGTA ATTTATGAGG GCCTGGATTG CGGCGATAAC
TACGTGATGG GCCACGAAAT TGCAGGTACC GTGGCTGCGG TAGGCGACGA CGTTATCAAC
TACAAAGTAG GCGACCGTGT TGCTTGTGTG GGCCCGAACG GTTGCGGTGG TTGCAAGTAT
TGCCGTGGTG CAATCGACAA CGTTTGCAAG AACGCATTTG GTGACTGGTT TGGTCTGGGC
TACGATGGTG GTTATCAGCA GTATCTGCTG GTAACCCGTC CGCGTAACCT GAGCCGTATC
CCAGATAACG TTTCCGCCGA CGTAGCGGCG GCATCTACCG ACGCGGTACT GACTCCGTAT
CATGCTATTA AGATGGCACA GGTGTCTCCT ACCAGCAACA TCCTGCTGAT CGGTGCGGGC
GGCCTGGGTG GTAACGCGAT CCAGGTAGCG AAAGCCTTCG GTGCAAAAGT TACTGTACTG
GATAAAAAAA AAGAGGCACG CGATCAAGCT AAAAAACTGG GTGCAGATGC GGTCTACGAA
ACTCTGCCGG AATCTATCTC TCCTGGTTCC TTCAGCGCTT GCTTCGATTT CGTCTCTGTA
CAGGCGACGT TCGATGTTTG CCAGAAATAT GTTGAGCCAA AAGGTGTAAT TATGCCGGTT
GGTCTGGGCG CGCCTAACCT GTCTTTTAAC CTGGGTGATC TGGCGCTGCG CGAAATTCGT
ATTCTGGGTT CCTTCTGGGG TACCACTAAC GATCTGGACG ACGTCCTGAA ACTGGTTTCC
GAGGGCAAAG TGAAACCGGT TGTTCGCAGC GCAAAACTGA AAGAGCTGCC GGAGTATATC
GAAAAACTGC GTAACAACGC GTATGAGGGT CGTGTTGTCT TTAACCCG

sADH16 (Accession No. BAN45671.1)

ATGCTGCGCA CTAATCTGCG CACGTTCGCT CGTCCGCAGT TTATTCGCGG CCTGGCGACT
GCGCCGGTAA TCCCGAAAAC CCAAAAAGGC GTTATTTTCT ACGAAAACGG TGGTGAACTG
CAGTACAAGG ACATCCCGGT ACCGGAGCCA AAACCGAACG AAATCCTGGT TAATGTTAAG
TACAGCGGTG TTTGTCACAC CGATCTGCAC GCCTGGAAGG GTGACTGGCC ACTGCCAGTG
AAACTGCCGC TGGTGGGTGG TCACGAGGGC GCCGGCATCG TGGTAGCTAA GGGCAGCGAA
GTAAAAAACT TTGAGATCGG TGATTATGCG GGCATCAAAT GGCTGAACGG CAGCTGTATG
AGCTGTGAGC TGTGCGAAAA AGGTTACGAA TCCAACTGCC TGCAGGCCGA TCTGAGCGGC
TATACCCATG ACGGTAGCTT TCAGCAATAC GCTACCGCGG ATGCGGTTCA GGCGGCTCAG
ATCCCGAAGA ACGTAGACCT GGCTGAGATC AGCCCTATCC TGTGCGCTGG TGTCACTGTT
TATAAGGCGC TGAAAACCGC GGATCTGGCT CCGGGCCAGT GGGTCGCTAT CTCTGGCGCG
GCTGGTGGTC TGGGTTCTCT GGCGGTGCAA TACGCTAAAG CTATGGGTCT GCGTGTCCTG
GGCATCGACG GTGGTGCAGA AAAAGAAAAG CTGTTTAAAA GCCTGGGTGG CGAGATCTTC
ATCGATTTCA CCAAAGAAAA AAACATCGTA GAAGCCATTC AGGAGGCAAC TAATGGCGGC
CCGCATGGCG TCATCAACGT ATCCGTTGCG GAAGCAGCGA TCTCTCAGTC CACCGAGTAT
GTTCGTCCGA CCGGTACCGT AGTACTGGTG GGTCTGCCAG CAGGTGCTGT CTGCAAAAGC
GAAGTGTTCT CTCACGTGGT AAAATCTATC TCTATCAAAG GCAGCTACGT GGGTAATCGT
GCGGACACCC GTGAGGCGAT CGACTTCTTC GAACGTGGTC TGGTGCGTAG CCCGATCAAG
ATCGTGGGTC TGAGCGAACT GCCGGAAGTG TACAAACTGA TGGAGCAGGG CAAAATCCTG

GGCCGTTACG TCGTGGATAC TACCAAA

sADH17 (Accession No. CAD36475.1)

ATGAAAGCGC TGCAATACAC CGAAATCGGT AGCGAACCGG TGGTCGTTGA TGTCCCGACC
CCTGCGCCGG GTCCGGGTGA AATTCTGCTG AAAGTAACCG CTGCGGGTCT GTGTCACAGC
GACATCTTCG TTATGGACAT GCCGGCTGAA CAGTATATCT ACGGCCTGCC GCTGACCCTG
GGCCATGAAG GCGTGGGCAC CGTTGCGGAA CTGGGTGCGG GCGTGACCGG TTTCGAAACT
GGCGACGCTG TTGCAGTTTA CGGCCCTTGG GGCTGTGGCG CTTGCCACGC ATGCGCACGT
GGCCGTGAGA ACTACTGCAC CCGTGCGGCA GAGCTGGGCA TCACTCCTCC GGGCCTGGGC
TCTCCGGGTA GCATGGCTGA GTACATGATC GTTGACTCCG CTCGTCACCT GGTCCCGATC
GGTGACCTGG ACCCGGTGGC AGCAGTGCCG CTGACCGATG CTGGCCTGAC CCCGTACCAC
GCCATCAGCC GTGTACTGCC GCTGCTGGGC CCAGGTTCTA CGGCTGTTGT AATTGGCGTC
GGTGGTCTGG GTCACGTTGG CATTCAGATT CTGCGCGCCG TTAGCGCCGC GCGTGTTATC
GCGGTTGATC TGGACGACGA CCGCCTGGCG CTGGCGCGTG AAGTTGGTGC AGATGCGGCT
GTTAAATCTG GTGCGGGTGC GGCGGATGCT ATTCGTGAAC TGACTGGTGG CGAAGGTGCT
ACTGCTGTTT TCGATTTTGT GGGTGCGCAG TCTACCATCG ACACCGCACA GCAAGTCGTG
GCAATCGATG GCCACATCAG CGTTGTCGGC ATCCACGCCG GTGCACACGC CAAAGTTGGT
TTCTTCATGA TCCCATTCGG TGCTAGCGTT GTTACCCCGT ATTGGGGTAC TCGCTCCGAG
CTGATGGACG TTGTTGATCT GGCTCGTGCA GGCCGCCTGG ATATTCATAC CGAAACCTTC
ACCCTGGACG AAGGCCCTAC TGCATACCGC CGTCTGCGCG AGGGCTCTAT CCGTGGCCGT
GGCGTGGTTG TACCGGGTTA A

F. DNA probes for rRNA depletion.

Name	Sequence
23S-3	CACTTATCTCTTCCGCATTTAGCTACCGGGCAGTGCCATTGGCATGACAACCCGAACACCAGTGATGCGTCCACT CCGGT
23S-4	CCTCTCGTACTAGGAGCAGCCCCCCTCAGTTCTCCAGCGCCCACGGCAGATAGGGACCGAACTGTCTCACGACG TTCTAA
23S-5	ACCCAGCTCGCGTACCACTTTAAATGGCGAACAGCCATACCCTTGGGACCTACTTCAGCCCCAGGATGTGATGAG CCGAC
23S-6	ATCGAGGTGCCAAACACCGCCGTCGATATGAACTCTTGGGCGGTATCAGCCTGTTATCCCCGGAGTACCTTTTAT CCGTT
23S-7	GAGCGATGGCCCTTCCATTCAGAACCACCGGATCACTATGACCTGCTTTCGCACCTGCTCGCGCCGTCACGCTC GCAGTC
23S-8	AAGCTGGCTTATGCCATTGCACTAACCTCCTGATGTCCGACCAGGATTAGCCAACCTTCGTGCTCCTCCGTTACTC TTTA
23S-9	GGAGGAGACCGCCCCAGTCAAACTACCCACCAGACACTGTCCGCAACCCGGATTACGGGTCAACGTTAGAACAT CAAACA
23S-10	TTAAAGGGTGGTATTTCAAGGTCGGCTCCATGCAGACTGGCGTCCACACTTCAAAGCCTCCCACCTATCCTACAC ATCAA
23S-11	GGCTCAATGTTCAGTGTCAAGCTATAGTAAAGGTTCACGGGGTCTTTCCGTCTTGCCGCGGGTACACTGCATCTT CACAG
23S-12	CGAGTTCAATTTCACTGAGTCTCGGGTGGAGACAGCCTGGCCATCATTACGCCATTCGTGCAGGTCGGAACTTAC CCGAC
23S-13	AAGGAATTTCGCTACCTTAGGACCGTTATAGTTACGGCCGCCGTTTACCGGGGCTTCGATCAAGAGCTTCGCTTG CGCTA
23S-14	ACCCCATCAATTAACCTTCCGGCACCGGGCAGGCGTCACACCGTATACGTCCACTTTCGTGTTTGCACAGTGCTG TGTTT
23S-15	TTAATAAACAGTTGCAGCCAGCTGGTATCTTCGACTGATTTCAGCTCCACGAGCAAGTCGCTTCACCTACATATCA GCGT
23S-16	GCCTTCTCCCGAAGTTACGGCACCATTTTGCCTAGTTCCTTCACCCGAGTTCTCTCAAGCGCCTTGGTATTCTCTA CCTG
23S-17	ACCACCTGTGTCGGTTTGGGGTACGATTTGATGTTACCTGATGCTTAGAGGCTTTTCCTGGAAGCAGGGCATTTGT TGCT
23S-18	TCAGCACCGTAGTGCCTCGTCATCACGCCTCAGCCTTGATTTTCCGGATTTGCCTGGAAAATCAGCCTACACGCTT AAAC
23S-19	CGGGACAACCGTCGCCCGGCCAACATAGCCTTCTCCGTCCCCCCTTCGCAGTAACACCAAGTACAGGAATATTAA CCTGT
23S-20	TTCCCATCGACTACGCCTTTCGGCCTCGCCTTAGGGGTCGACTCACCCTGCCCCGATTAACGTTGGACAGGAACC

	CTTGG
23S-21	TCTTCCGGCGAGCGGGCTTTTCACCCGCTTTATCGTTACTTATGTCAGCATTCGCACTTCTGATACCTCCAGCATA CCTC
23S-22	ACAGTACACCTTCACAGGCTTACAGAACGCTCCCCTACCCAACAACGCATAAGCGTCGCTGCCGCAGCTTCGGTG CATGG
23S-23	TTTAGCCCCGTTACATCTTCCGCGCAGGCCGACTCGACCAGTGAGCTATTACGCTTTCTTTAAATGATGGCTGCTT CTAA
23S-24	GCCAACATCCTGGCTGTCTGGGCCTTCCCACATCGTTTCCCACTTAACCATGACTTTGGGACCTTAGCTGGCGGT CTGGG
23S-25	TTGTTTCCCTCTTCACGACGGACGTTAGCACCCGCCGTGTGTCTCCCGTGATAACATTCTCCGGTATTCGCAGTTT GCAT
23S-26	CGGGTTGGTAAGTCGGGATGACCCCCTTGCCGAAACAGTGCTCTACCCCCGGAGATGAGTTCACGAGGCGCTAC CTAAAT
23S-27	AGCTTTCGGGGAGAACCAGCTATCTCCCGGTTTGATTGGCCTTTCACCCCCAGCCACAAGTCATCCGCTAATTTTT CAAC
23S-28	ATTAGTCGGTTCGGTCCTCCAGTTAGTGTTACCCAACCTTCAACCTGCCCATGGCTAGATCACCGGGTTTCGGGT CTATA
23S-29	CCCTGCAACTTAACGCCCAGTTAAGACTCGGTTTCCCTTCGGCTCCCCTATTCGGTTAACCTTGCTACAGAATATA AGTC
23S-30	GCTGACCCATTATACAAAAGGTACGCAGTCACACGCCTAAGCATGCTCCCACTGCTTGTACGTACACGGTTTCAG GTTCT
23S-31	TTTTCACTCCCCTCGCCGGGGTTCTTTTCGCCTTTCCCTCACGGTACTGGTTCACTATCGGTCAGTCAGGAGTATT TAGC
23S-32	CTTGGAGGATGGTCCCCCCATATTCAGACAGGATACCACGTGTCCCGCCCTACTCATCGAGCTCACAGCATGTGC ATTTT
23S-33	TGTGTACGGGGCTGTCACCCTGTATCGCGCGCCTTTCCAGACGCTTCCACTAACACACACACTGATTCAGGCTCT GGGCT
23S-34	CCTCCCCGTTCGCTCGCCGCTACTGGGGGAATCTCGGTTGATTTCTTTTCCTCGGGGTACTTAGATGTTTCAGTTC CCCC
23S-35	GGTTCGCCTCATTAACCTATGGATTCAGTTAATGATAGTGTGTCGAAACACACTGGGTTTCCCCATTCGGAAATCG CCGG
23S-36	TTATAACGGTTCATATCACCTTACCGACGCTTATCGCAGATTAGCACGTCCTTCATCGCCTCTGACTGCCAGGGCA TCCA
23S-37	CCGTGTACGCTTAGTCGCTTAA
16S-1	TAAGGAGGTGATCCAACCGCAGGTTCCCCTACGGTTACCTTGTTACGACTTCACCCCAGTCATGAATCACAAAGT GGTAA
16S-2	GCGCCCTCCCGAAGGTTAAGCTACCTACTTCTTTTGCAACCCACTCCCATGGTGTGACGGGCGGTGTGTACAAGG CCCGG
16S-3	GAACGTATTCACCGTGGCATTCTGATCCACGATTACTAGCGATTCCGACTTCATGGAGTCGAGTTGCAGACTCCAA TCCG
16S-4	GACTACGACGCACTTTATGAGGTCCGCTTGCTCTCGCGAGGTCGCTTCTCTTTGTATGCGCCATTGTAGCACGTG TGTAG
16S-5	CCCTGGTCGTAAGGGCCATGATGACTTGACGTCATCCCCACCTTCCTCCAGTTTATCACTGGCAGTCTCCTTTGA GTTCC
16S-6	CGGCCGGACCGCTGGCAACAAAAGATAAGGGTTGCGCTCGTTGCGGGACTTAACCCAACATTTCACAACACGAG CTGACG
16S-7	ACAGCCATGCAGCACCTGTCTCACAGTTCCCGAAGGCACCAATCCATCTCTGGAAAGTTCTGTGGATGTCAAGAC CAGGT
16S-8	AAGGTTCTTCGCGTTGCATCGAATTAAACCACATGCTCCACCGCTTGTGCGGGCCCCCGTCAATTCATTTGAGTTT TAAC
16S-9	CTTGCGGCCGTACTCCCCAGGCGGTCGACTTAACGCGTTAGCTCCGGTAGCCACGCCTCAAGGGCACAACCTCC AAGTCG
16S-10	ACATCGTTTACGGCGTGGACTACCAGGGTATCTAATCCTGTTTGCTCCCCACGCTTTCGCACCTGAGCGTCAGTC TTCGT
16S-11	CCAGGGGGCCGCCTTCGCCACCGGTATTCCTCCAGATCTCTACGCATTTCACCGCTACACCTGGAATTCTACCCC CCTCT
16S-12	ACGAGACTCAAGCTTGCCAGTATCAGATGCAGTTCCCAGGTTGAGCCCGGGGATTTCACATCTGACTTAACAAAC CGCCT
16S-13	GCGTGCGCTTTACGCCCAGTAATTCCGATTAACGCTTGCACCCTCCGTATTACCGCGGCTGCTGGCACGGAGTTA GCCGG
16S-14	TGCTTCTTCTGCGGGTAACGTCAATGAGCAAAGGTATTAACTTTACTCCCTTCCTCCCCGCTGAAAGTACTTTACA ACCC
16S-15	GAAGGCCTTCTTCATACACGCGGCATGGCTGCATCAGGCTTGCGCCCATTGTGCAATATTCCCCACTGCTGCCTC CCGTA
16S-16	GGAGTCTGGACCGTGTCTCAGTTCCAGTGTGGCTGGTCATCCTCTCAGACCAGCTAGGGATCGTCGCCTAGGTG AGCCGT
16S-17	TACCCCACCTACTAGCTAATCCCATCTGGGCACATCCGATGGCAAGAGGCCCGAAGGTCCCCCTCTTTGGTCTTG CGACG

16S-18	TTATGCGGTATTAGCTACCGTTTCCAGTAGTTATCCCCCTCCATCAGGCAGTTTCCCAGACATTACTCACCCGTCC GCCA
16S-19	CTCGTCAGCAAAGAAGCAAGCTTCTTCCTGTTACCGTTCGACTTGCATGTGTTAGGCCTGCCGCCAGCGTTCAAT CTGAG
16S-20	CCATGATCAAACTCTTCAATTTAAA
5S-1	ATGCCTGGCAGTTCCCTACTCTCGCATGGGGAGACCCCACACTACCATCGGCGCTACGGCGTTTCACTTCTGAGT TCGGC
5S-2	ATGGGGTCAGGTGGGACCACCGCGCTACGGCCGCCAGGCA
23S-1	AAGGTTAAGCCTCACGGTTCATTAGTACCGGTTAGCTCAACGCATCGCTGCGCTTACACACCCGGCCTATCAACG TCGTC
23S-2	GTCTTCAACGTTCCTTCAGGACTCTCAAGGAGTCAGGGAGAACTCATCTCGGGGCAAGTTTCGTGCTTAGATGCT TTCAG

G. Open reading frame for *pncB* and *rpoC*

pcnB

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   1  GTGCTAAGCC GCGAGGAAAG CGAGGCTGAA CAGGCAGTCG CCCGTCCACA GGTGACGGTG
  61  ATCCCGCGTG AGCAGCATGC TATTTCCCGC AAAGATATCA GTGAAAATGC CCTGAAGGTA
 121  ATGTACAGGC TCAATAAAGC GGGATACGAA GCCTGGCTGG TTGGCGGCGG CGTGCGCGAC
 181  CTGTTACTTG GCAAAAAGCC GAAAGATTTT GACGTAACCA CTAACGCCAC GCCTGAGCAG
 241  GTGCGCAAAC TGTTCCGTAA CTGCCGCCTG GTGGGTCGCC GTTTCCGTCT GGCTCATGTA
 301  ATGTTTGGCC CGGAGATTAT CGAAGTTGCG ACCTTCCGTG GACACCACGA AGGTAACGTC
 361  AGCGACCGCA CGACCTCCCA ACGCGGGCAA AACGGCATGT TGCTGCGCGA CAACATTTTC
 421  GGCTCCATCG AAGAAGACGC CCAGCGCCGC GATTTCACTA TCAACAGCCT GTATTACAGC
 481  GTAGCGGATT TTACCGTCCG TGATTACGTT GGCGGCATGA AGGATCTGAA GGACGGCGTT
 541  ATCCGTCTGA TTGGTAACCC GGAAACGCGC TACCGTGAAG ATCCGGTACG TATGCTGCGC
 601  GCGGTACGTT TTGCCGCCAA ATTGGGTATG CGCATCAGCC CGGAAACCGC AGAACCGATC
 661  CCTCGCCTCG CTACCCTGCT GAACGATATC CCACCGGCAC GCCTGTTTGA AGAATCGCTT
 721  AAACTGCTAC AAGCGGGCTA CGGTTACGAA ACCTATAAGC TGTTGTGTGA ATATCATCTG
 781  TTCCAGCCGC TGTTCCCGAC CATTACCCGC TACTTCACGG AAAATGGCGA CAGCCCGATG
 841  GAGCGGATCA TTGAACAGGT GCTGAAGAAT ACCGATACGC GTATCCATAA CGATATGCGC
 901  GTGAACCCGG CGTTCCTGTT TGCCGCCATG TTCTGGTACC CACTGCTGGA GACGGCACAG
 961  AAGATCGCCC AGGAAAGCGG CCTGACCTAT CACGACGCTT TCGCGCTGGC GATGAACGAC
1021  GTGCTGGACG AAGCCTGCCG TTCACTGGCA ATCCCGAAAC GTCTGACGAC ATTAACCCGC
1081  GATATCTGGC AGTTGCAGTT GCGTATGTCC CGTCGTCAGG GTAAACGCGC ATGGAAACTG
1141  CTGGAGCATC CTAAGTTCCG TGCGGCTTAT GACCTGTTGG CCTTGCGAGC TGAAGTTGAG
1201  CGTAACGCTG AACTGCAGCG TCTGGTGAAA TGGTGGGGTG AGTTCCAGGT TTCCGCGCCA
1261  CCAGACCAAA AAGGGATGCT CAACGAGCTG GATGAAGAAC CGTCACCGCG TCGTCGTACT
1321  CGTCGTCCAC GCAAACGCGC ACCACGTCGT GAGGGTACCG CATGA
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rpoC

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   1  gtgAAAGATT TATTAAAGTT TCTGAAAGCG CAGACTAAAA CCGAAGAGTT TGATGCGATC
  61  AAAATTGCTC TGGCTTCGCC AGACATGATC CGTTCATGGT CTTTCGGTGA AGTTAAAAAG
 121  CCGGAAACCA TCAACTACCG TACGTTCAAA CCAGAACGTG ACGGCCTTTT CTGCGCCCGT
 181  ATCTTTGGGC CGGTAAAAGA TTACGAGTGC CTGTGCGGTA AGTACAAGCG CCTGAAACAC
 241  CGTGGCGTCA TCTGTGAGAA GTGCGGCGTT GAAGTGACCC AGACTAAAGT ACGCCGTGAG
 301  CGTATGGGCC ACATCGAACT GGCTTCCCCG ACTGCGCACA TCTGGTTCCT GAAATCGCTG
 361  CCGTCCCGTA TCGGTCTGCT GCTCGATATG CCGCTGCGCG ATATCGAACG CGTACTGTAC
 421  TTTGAATTCT ATGTGGTTAT CGAAGGCGGT ATGACCAACC TGGAACGTCA GCAGATCCTG
 481  ACTGAAGAGC AGTATCTGGA CGCGCTGGAA GAGTTCGGTG ACGAATTCGA CGCGAAGATG
 541  GGGGCGGAAG CAATCCAGGC TCTGCTGAAG AGCATGGATC TGGAGCAAGA GTGCGAACAG
 601  CTGCGTGAAG AGCTGAACGA AACCAACTCC GAAACCAAGC GTAAAAAGCT GACCAAGCGT
 661  ATCAAACTGC TGGAAGCGTT CGTTCAGTCT GGTAACAAAC CAGAGTGGAT GATCCTGACC
 721  GTTCTGCCGG TACTGCCGCC AGATCTGCGT CCGCTGGTTC CGCTGGATGG TGGTCGTTTC
 781  GCGACTTCTG ACCTGAACGA TCTGTATCGT CGCGTCATTA ACCGTAACAA CCGTCTGAAA
 841  CGTCTGCTGG ATCTGGCTGC GCCGGACATC ATCGTACGTA ACGAAAAACG TATGCTGCAG
 901  GAAGCGGTAG ACGCCCTGCT GGATAACGGT CGTCGCGGTC GTGCGATCAC CGGTTCTAAC
 961  AAGCGTCCTC TGAAATCTTT GGCCGACATG ATCAAAGGTA AACAGGGTCG TTTCCGTCAG
1021  AACCTGCTCG GTAAGCGTGT TGACTACTCC GGTCGTTCTG TAATCACCGT AGGTCCATAC
1081  CTGCGTCTGC ATCAGTGCGG TCTGCCGAAG AAAATGGCAC TGGAGCTGTT CAAACCGTTC
1141  ATCTACGGCA AGCTGGAACT GCGTGGTCTT GCTACCACCA TTAAAGCTGC GAAGAAAATG
1201  GTTGAGCGCG AAGAAGCTGT CGTTTGGGAT ATCCTGGACG AAGTTATCCG CGAACACCCG
1261  GTACTGCTGA ACCGTGCACC GACTCTGCAC CGTCTGGGTA TCCAGGCATT TGAACCGGTA
1321  CTGATCGAAG GTAAAGCTAT CCAGCTGCAC CCGCTGGTTT GTGCGGCATA TAACGCCGAC
1381  TTCGATGGTG ACCAGATGGC TGTTCACGTA CCGCTGACGC TGGAAGCCCA GCTGGAAGCG
1441  CGTGCGCTGA TGATGTCTAC CAACAACATC CTGTCCCCGG CGAACGGCGA ACCAATCATC
1501  GTTCCGTCTC AGGACGTTGT ACTGGGTCTG TACTACATGA CCCGTGACTG TGTTAACGCC
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1561  AAAGGCGAAG GCATGGTGCT GACTGGCCCG AAAGAAGCAG AACGTCTGTA TCGCTCTGGT
1621  CTGGCTTCTC TGCATGCGCG CGTTAAAGTG CGTATCACCG AGTATGAAAA AGATGCTAAC
1681  GGTGAATTAG TAGCGAAAAC CAGCCTGAAA GACACGACTG TTGGCCGTGC CATTCTGTGG
1741  ATGATTGTAC CGAAAGGTCT GCCTTACTCC ATCGTCAACC AGGCGCTGGG TAAAAAAGCA
1801  ATCTCCAAAA TGCTGAACAC CTGCTACCGC ATTCTCGGTC TGAAACCGAC CGTTATTTTT
1861  GCGGACCAGA TCATGTACAC CGGCTTCGCC TATGCAGCGC GTTCTGGTGC ATCTGTTGGT
1921  ATCGATGACA TGGTCATCCC GGAGAAGAAA CACGAAATCA TCTCCGAGGC AGAAGCAGAA
1981  GTTGCTGAAA TTCAGGAGCA GTTCCAGTCT GGTCTGGTAA CTGCGGGCGA ACGCTACAAC
2041  AAAGTTATCG ATATCTGGGC TGCGGCGAAC GATCGTGTAT CCAAAGCGAT GATGGATAAC
2101  CTGCAAACTG AAACCGTGAT TAACCGTGAC GGTCAGGAAG AGAAGCAGGT TTCCTTCAAC
2161  AGCATCTACA TGATGGCCGA CTCCGGTGCG CGTGGTTCTG CGGCACAGAT TCGTCAGCTT
2221  GCTGGTATGC GTGGTCTGAT GGCGAAGCCG GATGGCTCCA TCATCGAAAC GCCAATCACC
2281  GCGAACTTCC GTGAAGGTCT GAACGTACTC CAGTACTTCA TCTCCACCCA CGGTGCTCGT
2341  AAAGGTCTGG CGGATACCGC ACTGAAAACT GCGAACTCCG GTTACCTGAC TCGTCGTCTG
2401  GTTGACGTGG CGCAGGACCT GGTGGTTACC GAAGACGATT GTGGTACCCA TGAAGGTATC
2461  ATGATGACTC CGGTTATCGA GGGTGGTGAC GTTAAAGAGC CGCTGCGCGA TCGCGTACTG
2521  GGTCGTGTAA CTGCTGAAGA CGTTCTGAAG CCGGGTACTG CTGATATCCT CGTTCCGCGC
2581  AACACGCTGC TGCACGAACA GTGGTGTGAC CTGCTGGAAG AGAACTCTGT CGACGCGGTT
2641  AAAGTACGTT CTGTTGTATC TTGTGACACC GACTTTGGTG TATGTGCGCA CTGCTACGGT
2701  CGTGACCTGG CGCGTGGCCA CATCATCAAC AAGGGTGAAG CAATCGGTGT TATCGCGGCA
2761  CAGTCCATCG GTGAACCGGG TACACAGCTG ACCATGCGTA CGTTCCACAT CGGTGGTGCG
2821  GCATCTCGTG CGGCTGCTGA ATCCAGCATC CAAGTGAAAA ACAAAGGTAG CATCAAGCTC
2881  AGCAACGTGA AGTCGGTTGT GAACTCCAGC GGTAAACTGG TTATCACTTC CCGTAATACT
2941  GAACTGAAAC TGATCGACGA ATTCGGTCGT ACTAAAGAAA GCTACAAAGT ACCTTACGGT
3001  GCGGTACTGG CGAAAGGCGA TGGCGAACAG GTTGCTGGCG GCGAAACCGT TGCAAACTGG
3061  GACCCGCACA CCATGCCGGT TATCACCGAA GTAAGCGGTT TTGTACGCTT TACTGACATG
3121  ATCGACGGCC AGACCATTAC GCGTCAGACC GACGAACTGA CCGGTCTGTC TTCGCTGGTG
3181  GTTCTGGATT CCGCAGAACG TACCGCAGGT GGTAAAGATC TGCGTCCGGC ACTGAAAATC
3241  GTTGATGCTC AGGGTAACGA CGTTCTGATC CCAGGTACCG ATATGCCAGC GCAGTACTTC
3301  CTGCCGGGTA AAGCGATTGT TCAGCTGGAA GATGGCGTAC AGATCAGCTC TGGTGACACC
3361  CTGGCGCGTA TTCCGCAGGA ATCCGGCGGT ACCAAGGACA TCACCGGTGG TCTGCCGCGC
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3481  GGTATCGTTT CCTTCGGTAA AGAAACCAAA GGTAAACGTC GTCTGGTTAT CACCCCGGTA
3541  GACGGTAGCG ATCCGTACGA AGAGATGATT CCGAAATGGC GTCAGCTCAA CGTGTTCGAA
3601  GGTGAACGTG TAGAACGTGG TGACGTAATT TCCGACGGTC CGGAAGCGCC GCACGACATT
3661  CTGCGTCTGC GTGGTGTTCA TGCTGTTACT CGTTACATCG TTAACGAAGT ACAGGACGTA
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3781  CTGCGTAAAG CTACCATCGT TAACGCGGGT AGCTCCGACT TCCTGGAAGG CGAACAGGTT
3841  GAATACTCTC GCGTCAAGAT CGCAAACCGC GAACTGGAAG CGAACGGCAA AGTGGGTGCA
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4081  ACCGGTTACG CGTACCACCA GGATCGTATG CGTCGCCGTG CTGCGGGTGA AGCTCCGGCT
4141  GCACCGCAGG TGACTGCAGA AGACGCATCT GCCAGCCTGG CAGAACTGCT GAACGCAGGT
4201  CTGGGCGGTT CTGATAACGA Gtaa
```

Figure S1. Fermentation pathways of *E. coli* and gene knockouts. Major fermentation pathways of *E. coli* and the five gene loci deleted in the DH1Δ5 strain (Δ*ackA-pta* Δ*adhE* Δ*ldhA* Δ*poxB* Δ*frdBC*).

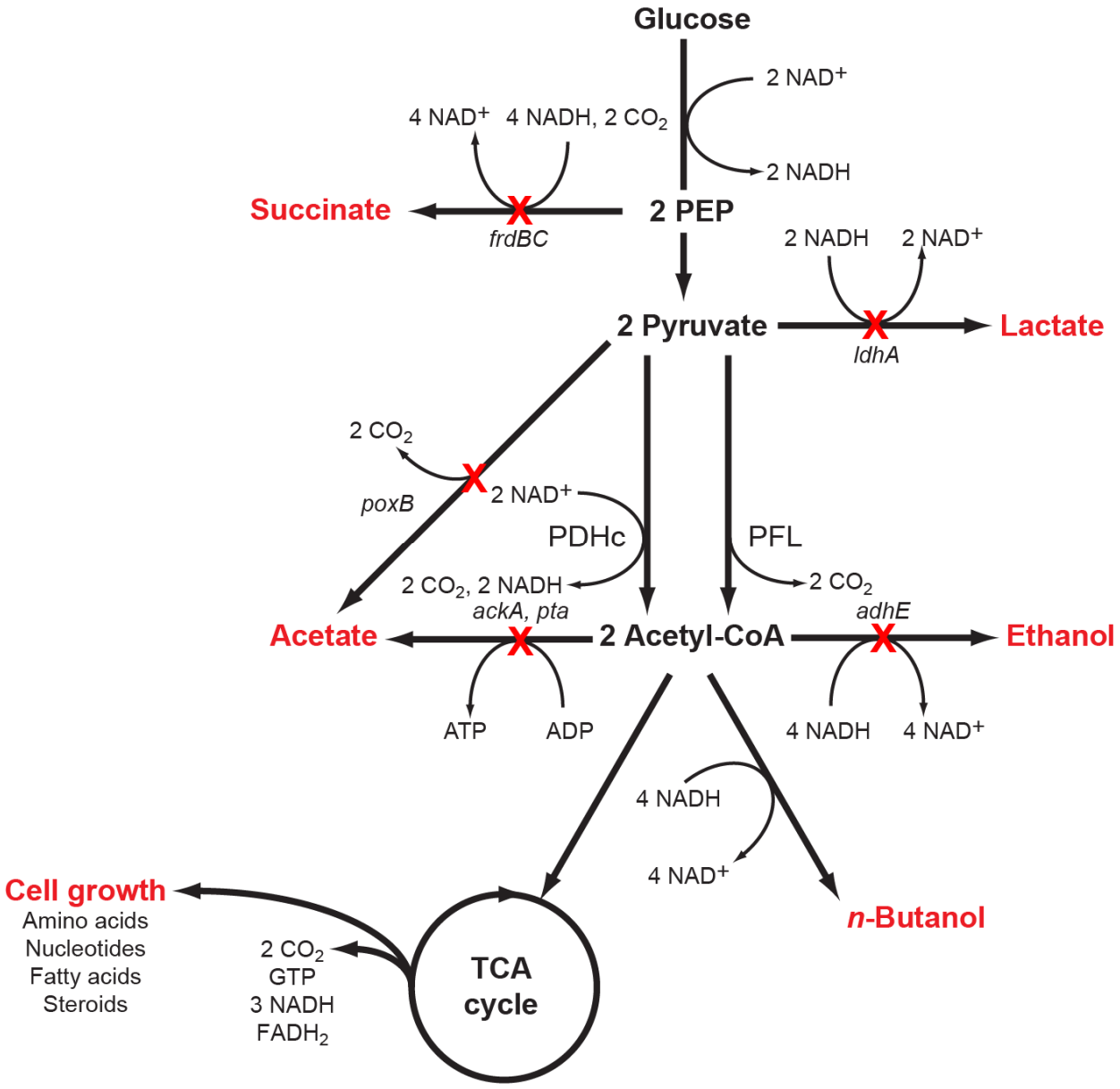


Figure S2. Dependence of the *n*-butanol:ethanol ratio on oxygen. When DH1 transformed with the first generation *n*-butanol pathway (pBT33-Bu2 pCWori-ter.adhE2 pBBR1-aceEF.lpd) is cultured under anaerobic conditions, the level of *n*-butanol drops but the level of ethanol remains similar. This result suggests that ethanol produced via AdhE2 can support cell growth under anaerobic conditions. Cultures were grown in TB with 2.5% (*w/v)* glucose media. Titers from aerobic cultures were analyzed via GC-FID after 3 d of growth and after 5 d for anaerobic cultures. Data are mean ± s.d. of biological replicates (n = 3).

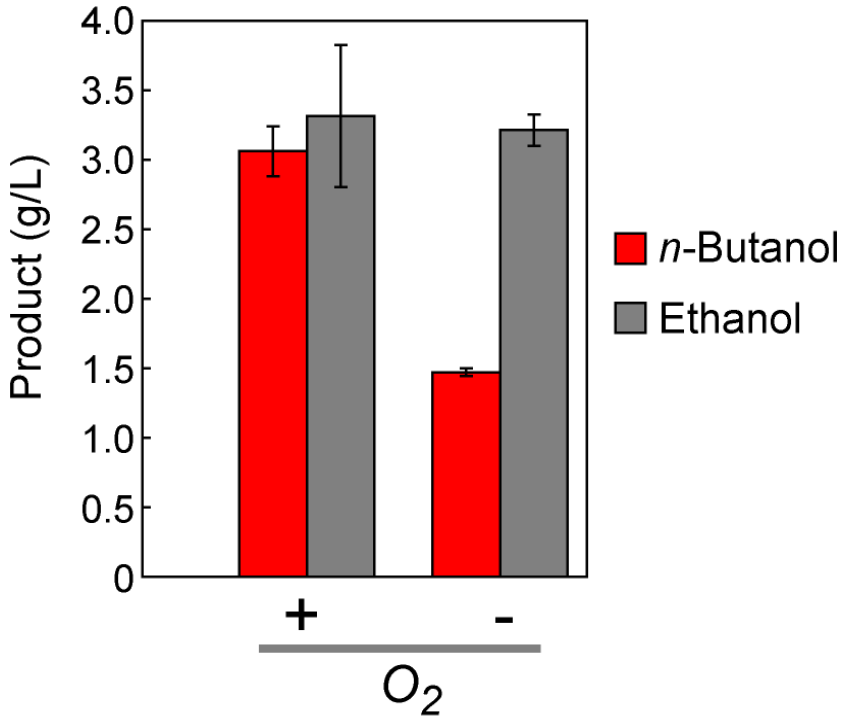
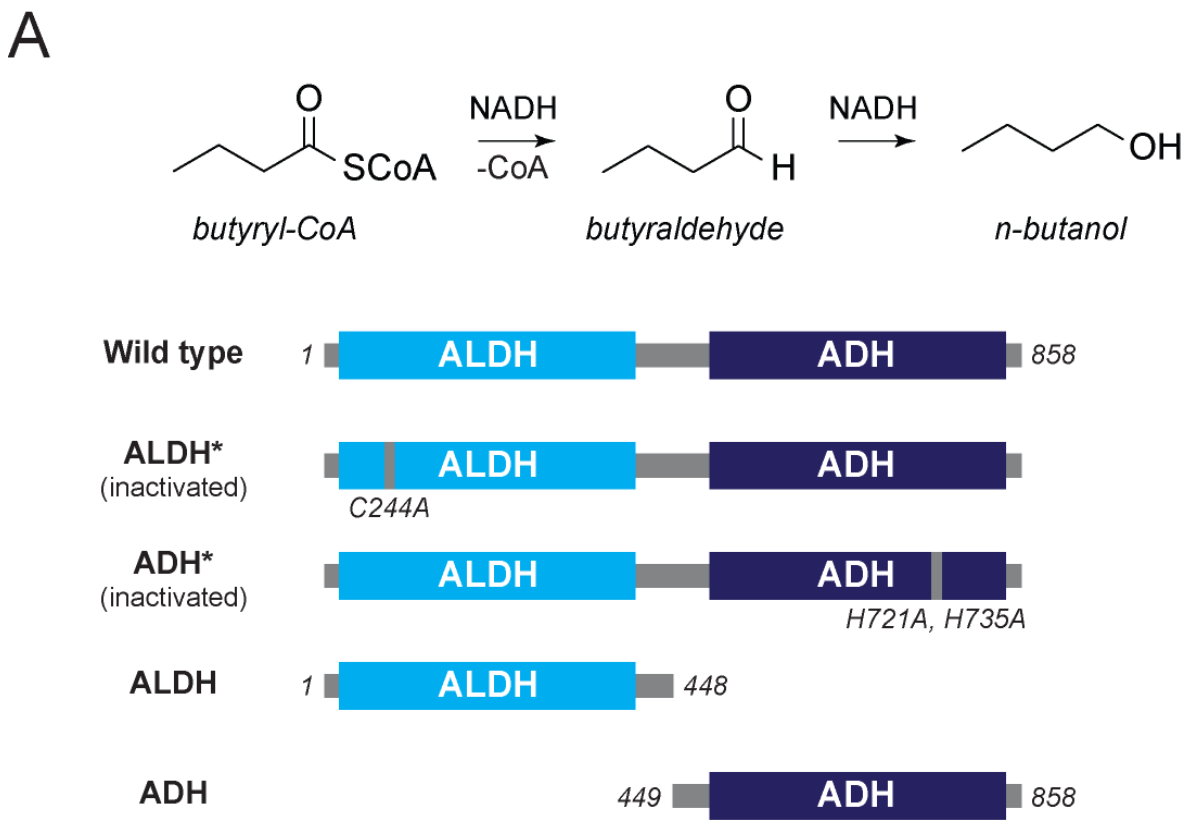
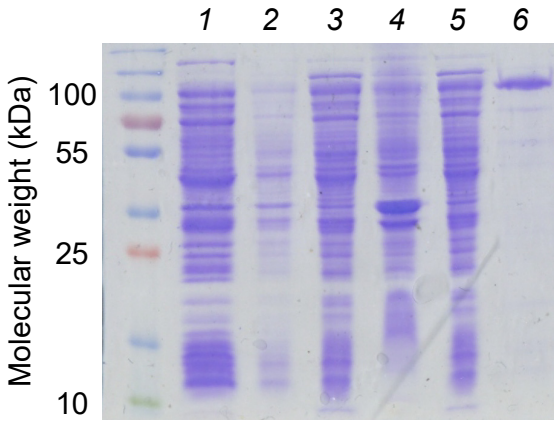


Figure S3. Biochemical characterization of AdhE2 constructs. The different domains of the bifunctional AdhE2 from *Clostridium acetobutylicum* were characterized biochemically using 5 different constructs and 3 different assays. (A) AdhE2 constructs consisted of domain-inactivated mutants of either the ALDH or ADH domain. Single domain constructs were also generated by truncation. (*, inactivated). (B) Representative SDS-PAGE of Strep tag affinity purification of full-length AdhE2s: Pre-induction (lane 1), post-induction (lane 2), soluble lysate (lane 3), insoluble lysate (lane 4), flow-through (lane 5), eluted AdhE2 (lane 6). (C) Wt AdhE2 was characterized by monitoring NADH oxidation in the presence of either an acyl-CoA (ALDH and ADH activity measured) or aldehyde (ADH activity measured). Activity was also measured by CoA release (ALDH activity measured). Domain inactivated and single domain constructs could be characterized directly by the NADH oxidation assay with addition of the appropriate substrate. k_{cat} and K_M were obtained by curve-fitting to the Michaelis–Menten parameters. Data are mean ± s.e. (n = 3) as derived from nonlinear curve fitting to the Michaelis−Menten equation. Error in the relative k_{cat}/K_M was obtained from propagation.was characterized using constructs.



B



C

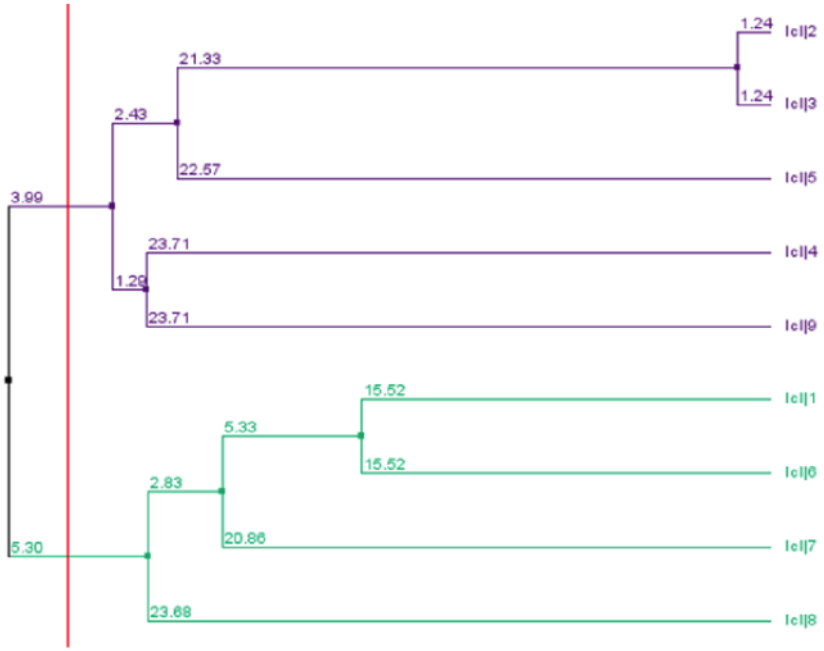
Enzyme	Substrate	k_{cat} (s^{-1})	K_M (μM)	k_{cat}/K_M (M^{-1} s^{-1})
WT AdhE2				
NADH oxidation	butyryl-CoA	2.2 ± 0.1	23 ± 2	(9.6 ± 0.3) x 10^4
(both domains)	acetyl-CoA	3.3 ± 0.1	250 ± 15	(1.3 ± 0.1) x 10^4
CoA release	butyryl-CoA	1.2 ± 0.1	10 ± 1	(1.1 ± 0.1) x 10^5
(ALDH domain)	acetyl-CoA	1.3 ± 0.1	100 ± 10	(1.3 ± 0.2) x 10^4
Aldehyde substrate	butyraldehyde	2.9 ± 0.1	4000 ± 400	(7.0 ± 0.2) x 10^2
(ADH domain)	acetaldehyde	5.6 ± 0.1	4500 ± 300	(1.2 ± 0.1) x 10^3
Domain mutants				
ALDH inactive	butyraldehyde	18.7 ± 1.3	2500 ± 500	(7.5 ± 0.7) x 10^3
	acetaldehyde	19.8 ± 1.0	2800 ± 400	(7.1 ± 0.3) x 10^3
ADH inactive	butyryl-CoA	0.3 ± 0.1	4 ± 1	(9.0 ± 1.0) x 10^4
	acetyl-CoA	1.3 ± 0.1	70 ± 10	(1.9 ± 0.4) x 10^4
Domain truncations				
ALDH	butyryl-CoA	< 0.1	n.d.	n.d.
ADH	butyraldehyde	0.2 ± 0.1	300 ± 50	(5.8 ± 0.4) x 10^2
	acetaldehyde	0.2 ± 0.1	2000 ± 700	(1.1 ± 0.2) x 10^2

Figure S4. Phylogenetic analysis of ALDH domains. (A) The biochemical literature was surveyed for ALDH domains characterized to have preference for acyl-CoA substrates larger than acetyl-CoA. Both monofunctional and bifunctional ALDH domains were considered, including the atypical ALDH DmpF that is a fusion with an aldolase domain. In the case of bifunctional ALDHs, only the specificity of the ALDH domain was considered. (B) A phylogenetic tree incorporating biochemically characterized ALDH domains was assembled to identify homologs that may have greater than C_4 substrate specificity. Sequences in purple have higher k_{cat}/K_M for acyl-CoAs larger than acetyl-CoA, and sequences in green have higher k_{cat}/K_M for acetyl-CoA. (C) The branching pattern of the biochemically informed tree was applied to all sequences in the ALDH family. Green sequences denote ALDH domains of bifunctional enzymes and red sequences denote monofunctional ALDH domains.

A

Preference	Gene	Accession No.	Organism	Reference
C_4 substrates	AdhE2	NP_149199	*Clostridium acetobutylicum*	This study
	ALD	AAD31841	*Clostridium beijerinckii*	J Toth *et al* [17]
	ALDH	YP_001310903	*Clostridium beijerinckii*	RT Yan *et al* [*18*]
	PduP	BAG26139	*Lactobacillus reuteri*	LH Luo *et al* [*19*]
	ALDH	YP_003687877	*Propionibacterium freudenreichii*	N Hosio *et al* [*20*]
C_2 substrates	AdhE	NP_415757	*Escherichia coli*	S Atsumi *et al* [*21*]
	AdhE	AAC47539	*Giardia intestinalis*	LB Sánchez *et al* [*22*]
	AdhE	AAV66076	*Leuconostoc mesenteroides*	OK Koo *et al* [*23*]
	DmpF	CAA43226	*Pseudomonas sp.* CF600	J Powlowski *et al* [*24*]

B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Icll2
21.33
1.24
Icll3
2.43
22.57
Icll5
3.99
23.71
Icll4
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23.71
Icll9
15.52
Icll1
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15.52
Icll6
2.83
20.86
Icll7
5.30
23.68
Icll8

C

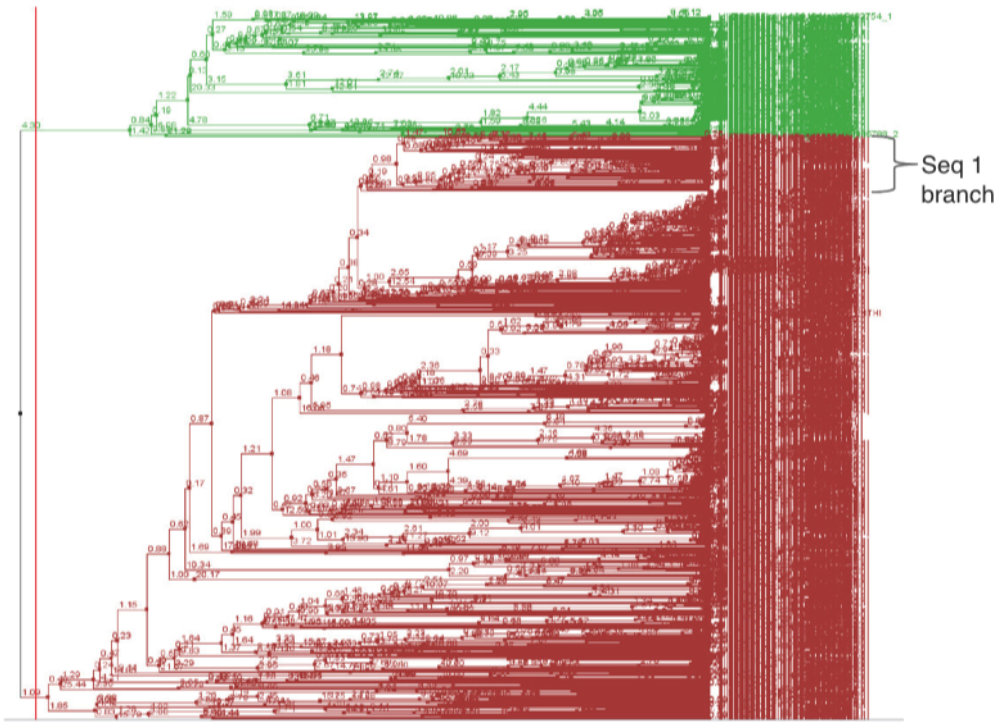
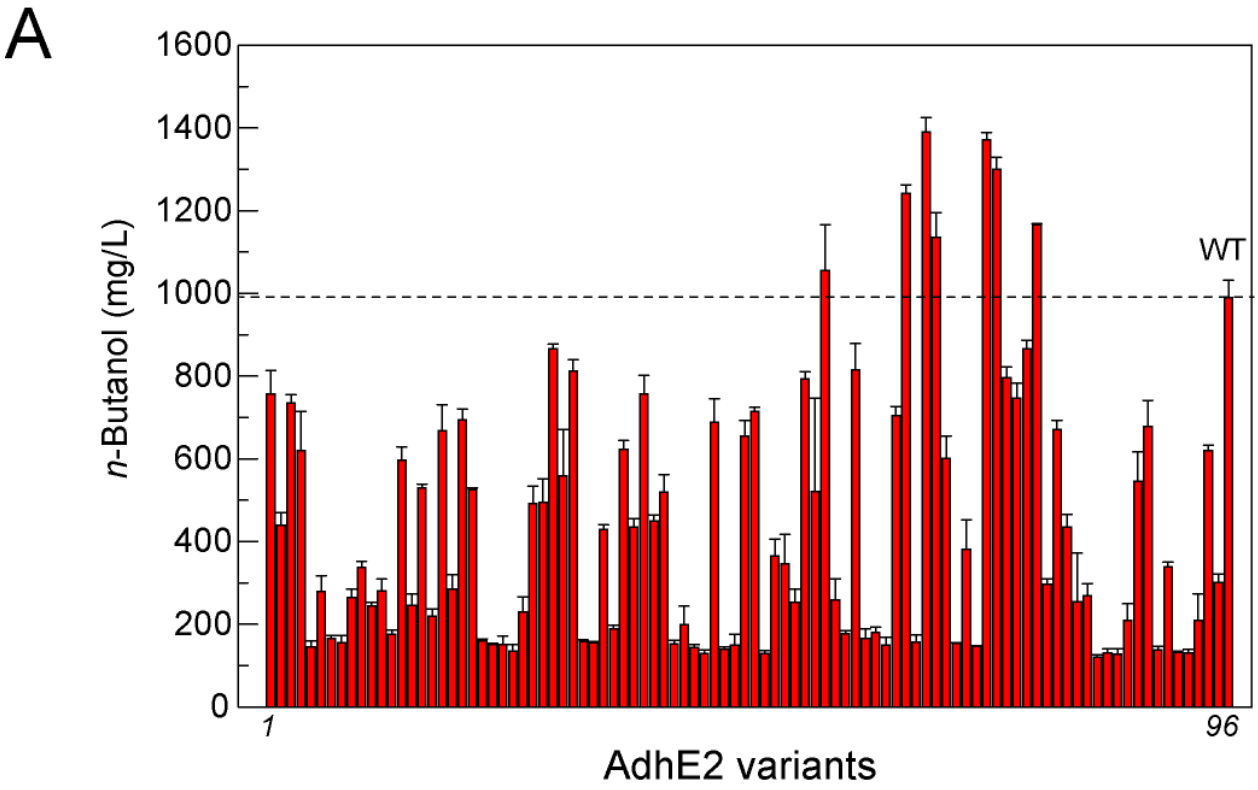
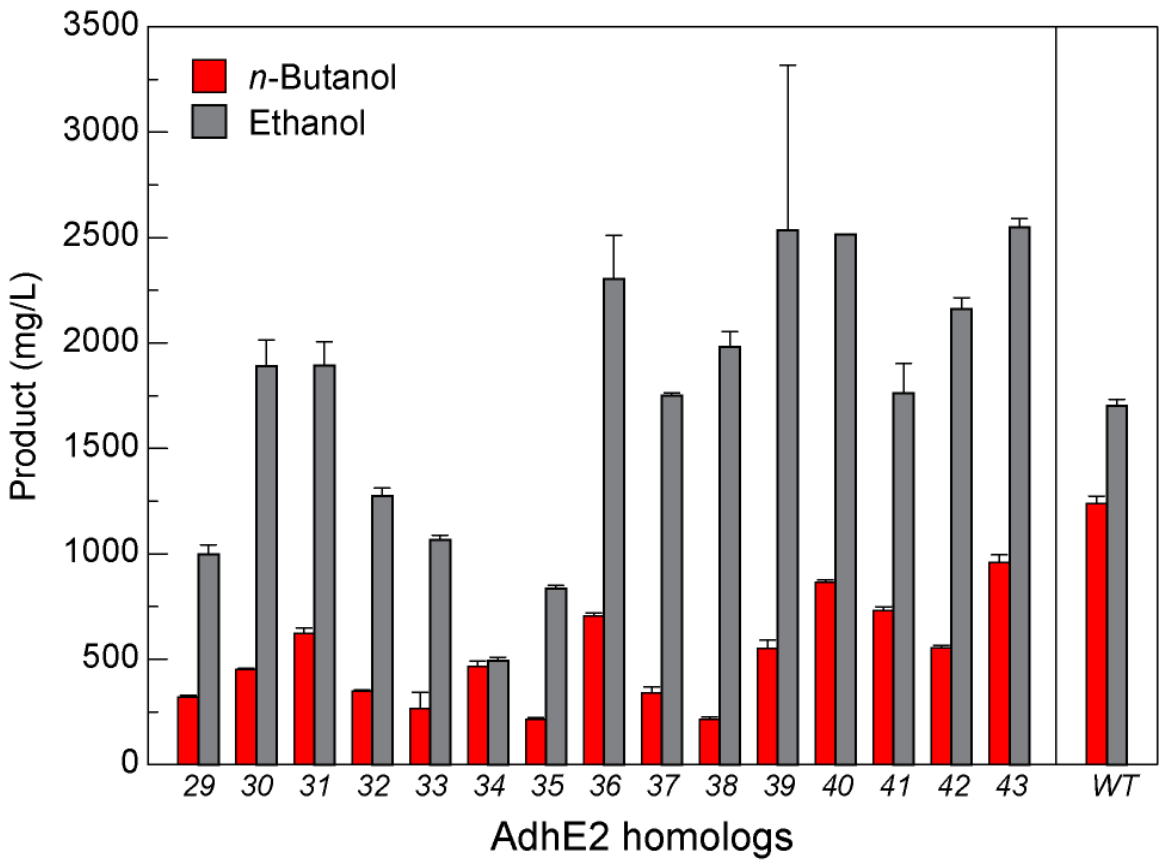

Seq 1
branch

Figure S5. Screening of AdhE2s. AdhEs were screened *in vivo* by co-transforming DH1 pBT33-Bu2 [*6*] and the pCDF3-ter.AdhE2 variants 1–96 or homologs 29–43. All strains were grown anaerobically in TB with 2.5% (*w/v)* glucose media for 3 d post induction before production titers were analyzed by GC-FID. (A) An initial panel of 96 variants of AdhE2 (AdhE2.1-96) was designed by Calysta to incorporate approximately 40 mutations selected from the natural sequence diversity of AdhE2 homologs. Each variant contained 3–5 mutations and every mutation was present in multiple variants. Around half of the variants produced minimal *n*-butanol, indicating that particular combinations of mutations resulted in non-functional enzymes. The remaining variants produced a wide range of titers in comparison to the wild type sequence. Some variants produced higher *n*-butanol titers, but upon further inspection, exhibited only mild improvements in *n*-butanol:ethanol ratio, suggesting the primary effect was an overall activity increase without shifting substrate specificity. Data are mean ± s.d. of biological replicates (n = 3). (B) AdhE2 homologs (AdhE29-43) sampled from the putative C_4 branch of the phylogenetic tree. Comparison of *n*-butanol and ethanol titers do not show any increased selectivity compared to WT (AdhE2 from *C. acetobutylicum*). Data are mean ± s.d. of biological replicates (n = 3).



B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2000
1500
1000
500
0
Product (mg/L)
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Ethanol
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
WT
AdhE2 homologs

Figure S6. Screening of monofunctional ALDHs for C_4 selectivity. Using the existing ALDH phylogenetic tree, the hypothetical C_4-selective branch was widely sampled for monofunctional ALDHs to incorporate the full diversity of the branch in a small number of sequences. These sequences (ALDH1-15 and 46) were screened *in vivo* by co-transforming DH1Δ*5* pBT33-Bu2 and the pCDF3-ter.ALDH plasmid. All strains were grown anaerobically in TB with 2.5% (*w/v)* glucose media for 3 d post induction before analyzing production titers by GC-FID. 15 of 16 monofunctional ALDHs produced more *n*-butanol than ethanol. Data are mean ± s.d. of biological replicates (n = 3).

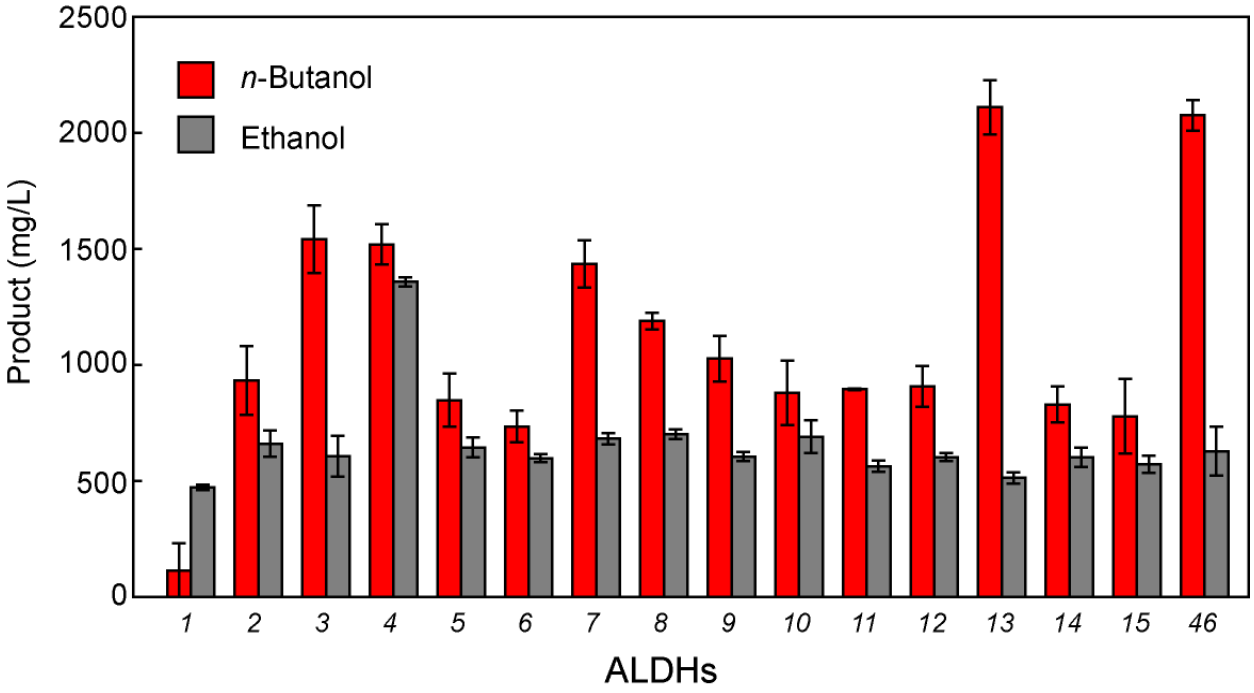
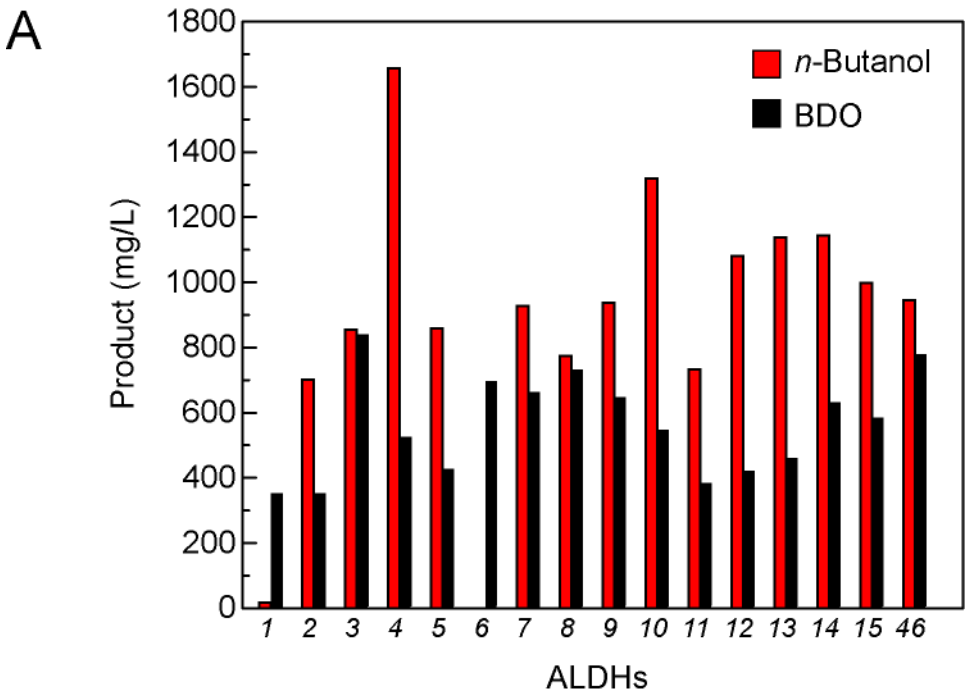


Figure S7. Screening monofunctional ALDHs for production of 1,3-butanediol (BDO). (A) The monofunctional ALDHs (ALDH1-16 and 46) were also screened *in vivo* for their ability to produce BDO. DH1Δ*5* was co-transformed with pBT33-Bu2 and the pCDF3-ter.ALDH plasmid for *n*-butanol production or pT5T33-phaA.hbd and pCDF3-ALDH for BDO production. (B) The stereochemical preference of the ALDHs were then tested by screening for the production of (3*R*)- compared to (3*S*)-BDO by using either pT5T33-phaA.phaB or pT5T33-phaA.hbd upstream of the ALDH enzyme on pCDF3-ALDH to produce either (*R*)-3-hydroxybutyryl-CoA or (*S*)-3-hydroxybutyryl-CoA, respectively. These data suggest that little stereochemical preference at the ALDH is observed. All strains were grown anaerobically in TB with 2.5% (*w*/*v*) glucose media for 3 d post induction before analyzing production titers. Screening was performed using GC-MS for product peak identification. The same method as described for *n*-butanol anlysis was used and the amount of product was quantified by comparison to a standard. Data are mean ± s.d. of biological replicates (n = 3).



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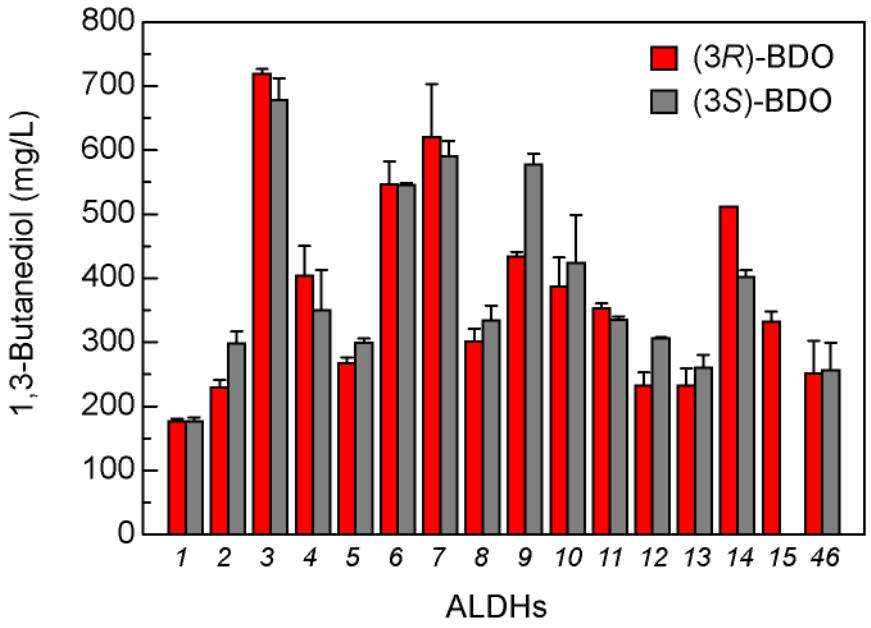
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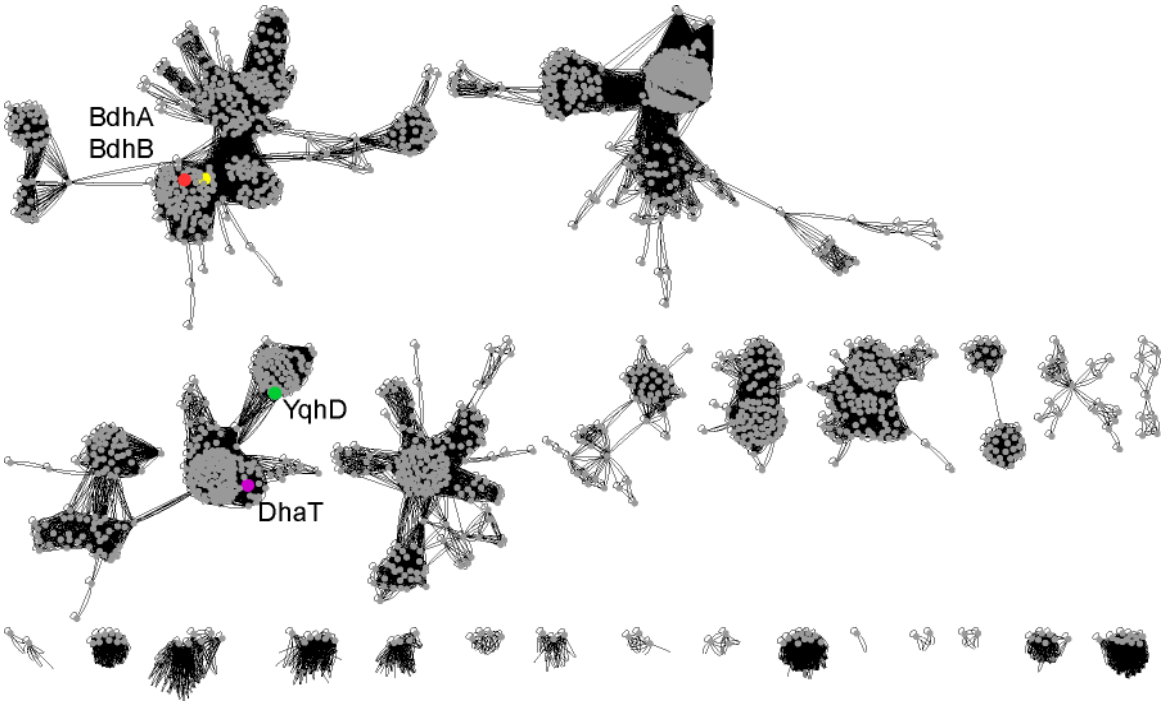
600
500
400
300
200
100
0
1,3-Butanediol (mg/L)
(3R)-BDO
(3S)-BDO
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
46
ALDHs

Figure S8. Identification and screening of ADHs for BDO production. (A) A sequence similarity network of the ADH family was generated to identify alcohol dehydrogenases that would efficiently reduce 3-hydroxybutyraldehyde to 1,3-butanediol. ADH sequences were blasted against each other and then clustered at increasingly stringent e-values, such that subfamilies become apparent. This network was then overlaid with ADHs of known substrate specificity as a frame of reference (BdhAB, butanol dehydrogenase; DhaT, 1,3-propanediol oxidoreductase; YqhD, $<C_3$ aldehyde reductase) [*25–27*]. (B) Sequences from the network were broadly sampled to maximize diversity and increase the likelihood of identifying a highly active ADH. (C) ADHs were also screened *in vivo* under anaerobic conditions for their ability to produce BDO by co-transforming DH1Δ*5* pBBR1-aceEF.lpd pT533-phaA.phaB/hbd with a pCWori.trc-ter-aldh46.ADH plasmid (ADH1-22 and DhaT2-8). In this case, the ADHs appear to be selective for production of (3*R*)-BDO. All strains were grown anaerobically in TB with 2.5% (*w/v)* glucose media for 5 d post induction before analyzing production titers by GC-MS. Data are mean ± s.d. of biological replicates (n = 3).

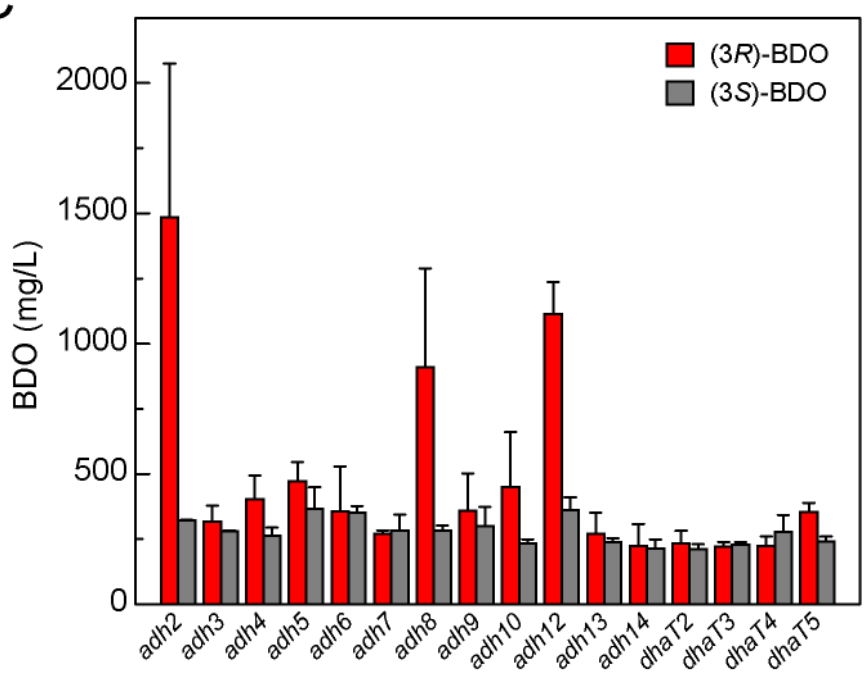
A



B

Gene	Accession No.	Organism
ADH1	B6YQP9_AZOPC	*Azobacteroides pseudotrichonymphae genomovar* CFP2
ADH2	A0RQF7_CAMFF	*Campylobacter fetus* subsp. *fetus* 82-40
ADH3	G5F136_9ACTN	*Olsenella* sp. oral taxon 809 F0356
ADH4	B1C7G7_9FIRM	*Anaerofustis stercorihominis* DSM 17244
ADH5	YUGK_BACSU	*Bacillus subtilis* 168
ADH6	A8SGI9_9FIRM	*Faecalibacterium prausnitzii* M21/2
ADH7	E2SQ66_9FIRM	*Erysipelotrichaceae bacterium* 3_1_53
ADH8	E1QYZ8_OLSUV	*Olsenella uli* ATCC 49627
ADH9	F5X0G1_STRG1	*Streptococcus gallolyticus* ATCC 43143 / F-1867
ADH10	E6W4G5_DESIS	*Desulfurispirillum indicum* ATCC BAA-1389 / S5
ADH11	E6K7W2_9BACT	*Prevotella buccae* ATCC 33574
ADH12	B1C4Z8_9FIRM	*Clostridium spiroforme* DSM 1552
ADH13	G4L3E3_TETHN	*Tetragenococcus halophilus* strain DSM 20338
ADH14	E8LLW8_9GAMM	*Succinatimonas hippei* YIT 12066
DhaT2	E4RKV2_HALSL	*Halanaerobium hydrogeniformans*
DhaT3	Q15G22_CITFR	*Citrobacter freundii*
DhaT4	A0PY50_CLONN	*Clostridium novyi* NT
DhaT5	Q3A1K9_PELCD	*Pelobacter carbinolicus* DSM 2380 / Gra Bd 1
DhaT6	A5D4X5_PELTS	*Pelotomaculum thermopropionicum* DSM 13744
DhaT7	B1V2D9_CLOPF	*Clostridium perfringens* D JGS1721
DhaT8	E3H9G9_ILYPC	*Ilyobacter polytropus* DSM 2926 / CuHBu1
ADH15	Q1JYE4_DESAC	*Desulfuromonas acetoxidans* DSM 684
ADH16	B5YIE2_THEYD	*Thermodesulfovibrio yellowstonii* ATCC 51303
ADH17	D2BSS7_DICD5	*Dickeya dadantii* Ech586
ADH18	F0ERB1_HAEPA	*Haemophilus parainfluenzae* ATCC 33392
ADH19	G5IQ05_9ENTE	*Enterococcus saccharolyticus* 30_1
ADH20	B2V5D0_CLOBA	*Clostridium botulinum* Alaska E43 / Type E3
ADH21	E2SME8_9FIRM	*Erysipelotrichaceae* sp. 3_1_53
ADH22	B0NYL0_9CLOT	*Clostridium* sp. SS2/1

C


(3R)-BDO
(3S)-BDO
BDO (mg/L)
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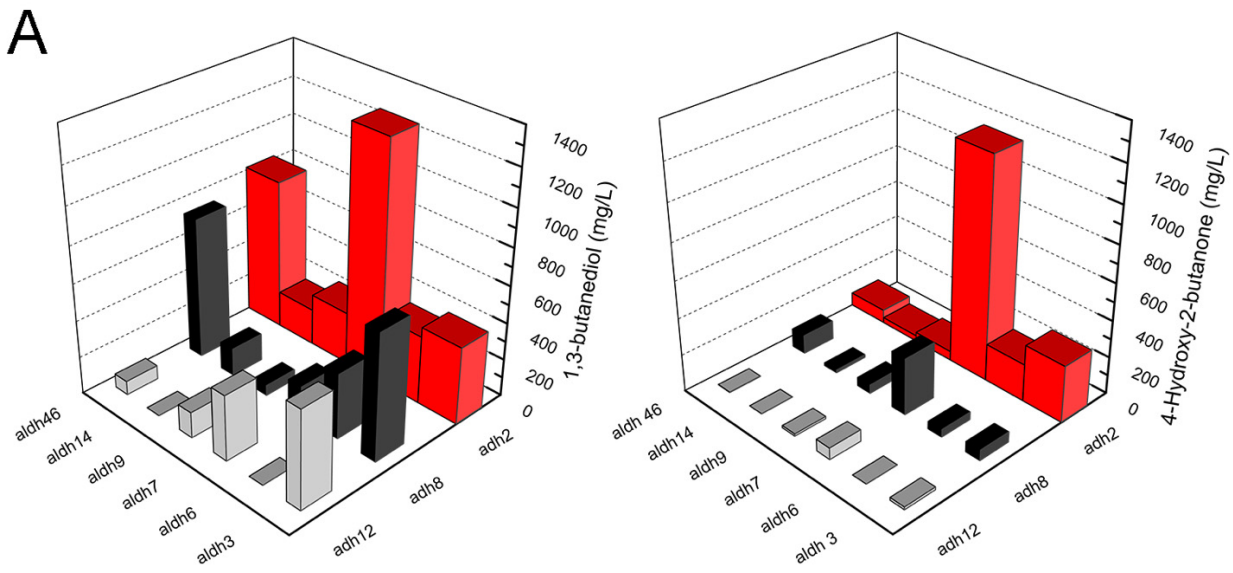
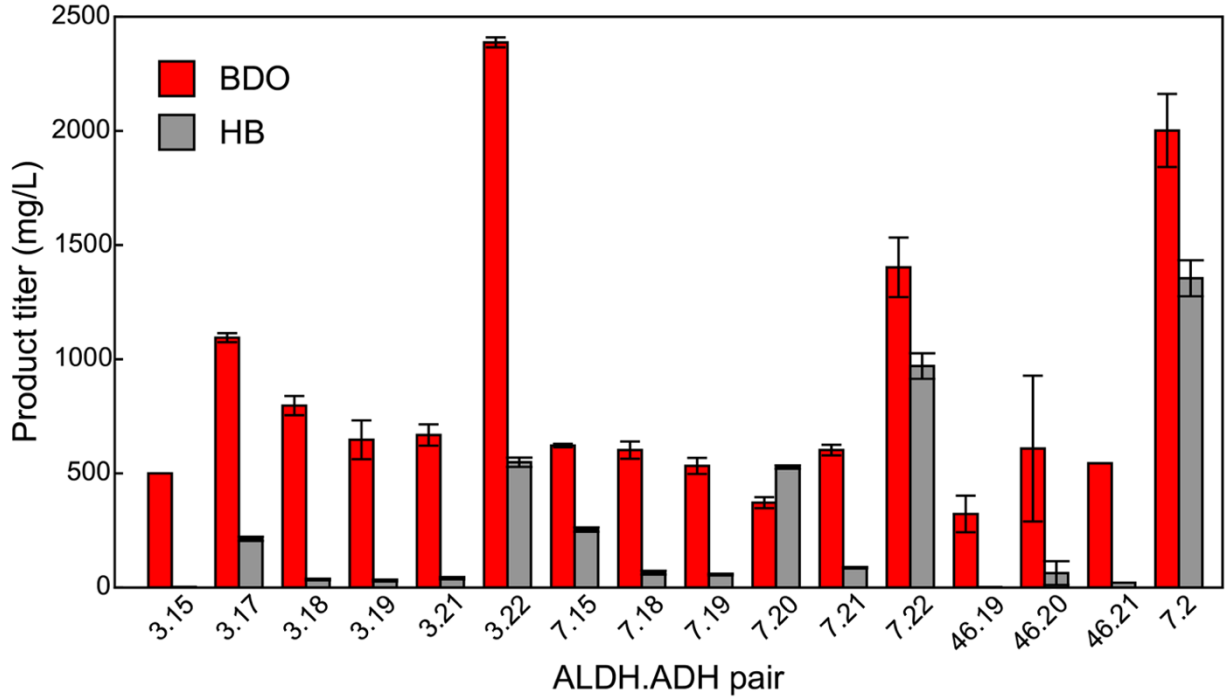
1500
1000
500
0
adh2
adh3
adh4
adh5
adh6
adh7
adh8
adh9
adh10
adh12
adh13
adh14
dhaT2
dhaT3
dhaT4
dhaT5

Figure S9. Optimizing ALDH-ADH pairs for BDO vs. 4-hydroxybutanone (HB) production. Having identified a number of ALDHs and ADHs competent for high titer butanediol production, we screened the combinatorial set of candidate enzymes to find optimal combinations. (A) A preliminary *in vivo* screen of DH1Δ*5* pT533-phaA.phaB pCWori.trc-ter-ALDH.ADH identified *aldh7.adh2* as the best overall performer for both BDO and HB production. Strains were grown anaerobically in TB with 2.5% (*w/v)* glucose media for 2 d post induction before analyzing production titers by LC-MS. Data are mean ± s.d. of biological replicates (n = 3). (B) To further optimize pathway selectivity, additional ADHs from the sequence similarity network were sampled to identify enzymes with greater specificity that would not enable hydroxybutanone production. The subfamilies containing ADH2, 8, and 12 were sampled at greater depth as these ADHs were shown to be most active in the initial screen. These screen identified a new optimal pair, *aldh3.adh22*, capable of capturing a large fraction of the C_4 product pool as butanediol and producing 3 g/L of total products. Strains were grown anaerobically in TB with 2.5% (*w/v)* glucose media for 3 d post induction before production titers were analyzed by LC-MS. Data are mean ± s.d. of biological replicates (n = 3).



B


BDO
HB
Product titer (mg/L)
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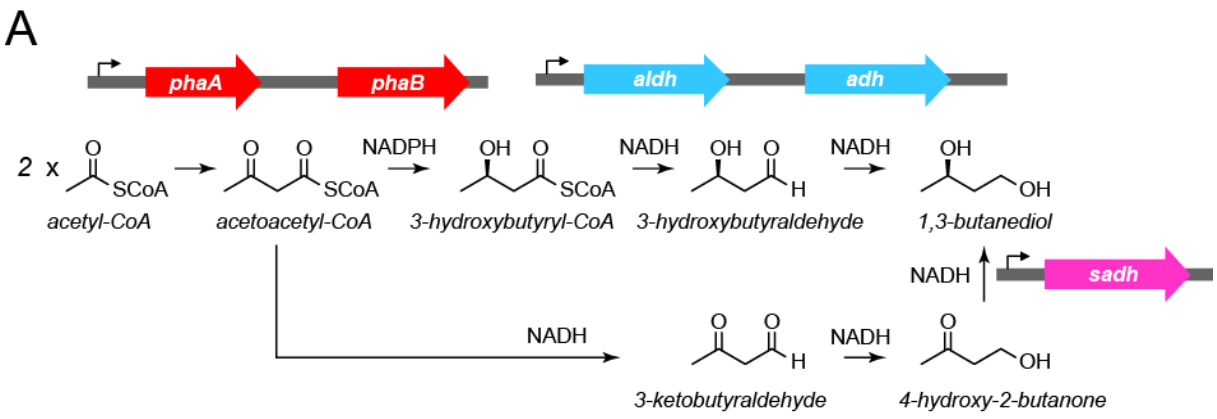
2000
1500
1000
500
0
3.15
3.17
3.18
3.19
3.21
3.22
7.15
7.18
7.19
7.20
7.21
7.22
46.19
46.20
46.21
7.2
ALDH.ADH pair

Figure S10. Screening of secondary ADHs (sADHs) to increase BDO selectivity. (A) A strategy for increasing the selectivity of BDO production is to use a secondary alcohol dehydrogenase (sADH) to reduce HB to BDO. (B) A list of sADHs that were either reported to reduce 4-hydroxy-2-butanone to 1,3-butanediol or have broad specificity for similar substrates was identified. A substantial number of these enzymes has been reported in bacteria, yeast, and parasitic protozoa. These enzymes are generally classified as zinc or iron-alcohol dehydrogenases and maximum percent identity within the sequences represented here range from 27–76%. (C) The identified sADHs were screened *in vivo* to characterize their BDO:HB selectivity by co-transforming DH1Δ*5* pBBR1-aceEF.lpd pT533-phaA.phaB with a pCWori.trc-sadhX-aldh7.adh2 plasmid (sADH1-15). The parent plasmid pCWori.trc-ter-aldh7.adh2 produced an even mixture of BDO and HB and served as the negative control. At least four sADHs enabled butanediol production of 2 g/L with hydroxybutanone production limited to <250 mg/L or less. This pathway design appears to maximize BDO production as the dead-end pathway from acetoacetyl-CoA reduction is eliminated. Strains were grown anaerobically in TB with 2.5% (*w/v)* glucose media for 4 d post induction before analyzing production titers by LC-MS. Data are mean ± s.d. of biological replicates (n = 3).



B

Gene	Accession No.	Organism	Reference
sADH1	KGK36767.1	*Pichia kudriavzevii*	R. C. Zheng *et al* [*28*]
sADH2	WP_011011186.1	*Pyrococcus furiosus* DSM 3638	R. Machielsen and J. Oost *et al* [*29, 30*]
sADH3	WP_011614641.1	*Cupriavidus necator*	A. Steinbüchel *et al* [31]
sADH4	P14941.1	*Thermoanaerobacter brockii*	R. J. Lamed *et al* [*32*]
sADH5	AAA23199.2	*Clostridium beijerinckii*	A. A. Ismaiel *et al* [*33*]
sADH6	XP_455102.1	*Kluyveromyces lactis* NRRL Y-1140	T. Oda *et al* [*34*]
sADH7	AAP39869.1	*Phytomonas* sp. ADU-2003	S. M. Molinas *et al* [*35*]
sADH8	Q0KDL6.1	*Ralstonia eutropha* H16	A. Steinbüchel *et al* [*36*]
sADH9	XP_001580601.1	*Trichomonas vaginalis* G3	R. Sutak and D. Leitsch *et al* [*37,38*]
sADH10	AJP52792.1	*Pseudomonas fluorescens*	C. T. Hou *et al* [*39*]
sADH11	WP_011835462.1	*Lactococcus lactis*	N. García-Quintáns *et al* [40]
sADH12	AAC04974.1	*Saccharomyces cerevisiae*	E. González *et al* [*41*]
sADH13	WP_000374004.1	*Escherichia coli*	H. Zhang *et al* [*42*]
sADH14	BAD32689.1	*Zygoascus ofunaensis*	K. Yamada Onodera *et al* [*43*]
sADH15	BAA24528.1	*Candida parapsilosis*	H. Yamamoto and H. Man *et al* [*44,45*]
sADH16	BAN45671.1	*Cyberlindnera jadinii*	T. Yang *et al* [*46*]
sADH17	CAD36475.1	*Rhodococcus ruber*	B. Kosjek *et al* [*47*]

C

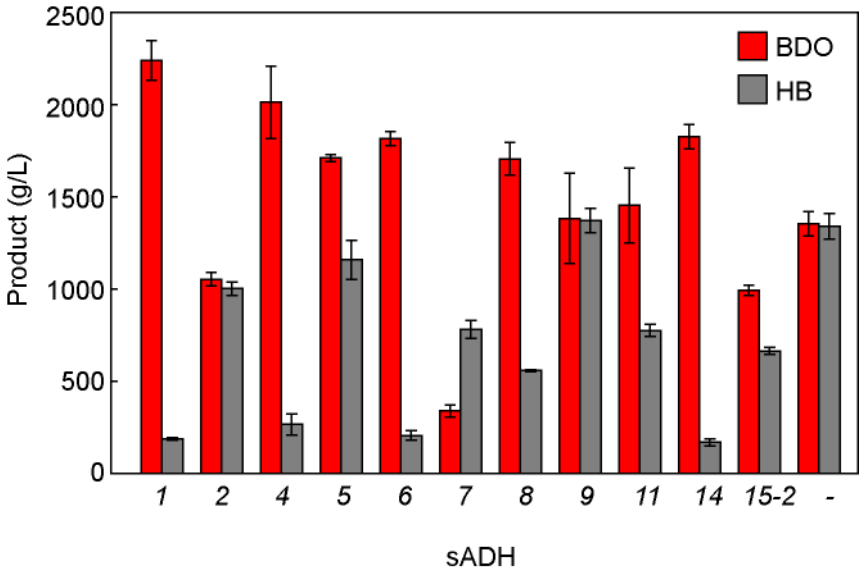


Figure S11. Development of a genetic selection for *n*-butanol production. Enrichment of higher productivity strains under anaerobic conditions. A small fraction of medium production strains (*E. coli* DH1Δ*5* pBT-0.3crt pCDF3-ter.aldh46) were mixed in a large excess of a low production strain (*E. coli* DH1Δ*5* pBT-0.03hbd pCDF3-ter.aldh46) to simulate a mutagenized library in which most mutations are neutral or deleterious. Over time the small fraction of medium production cells were found to proliferate and dominate the culture as monitored by qPCR (*Figure 3*). The length of the lag phase appears to correlate with the initial abundance of medium production cells. Strains were grown anaerobically in TB with 2.5% (*w/v)* glucose media over the course of 5 d, cultures containing the medium production strain were competent to attain high OD_{600} and butanol titer.

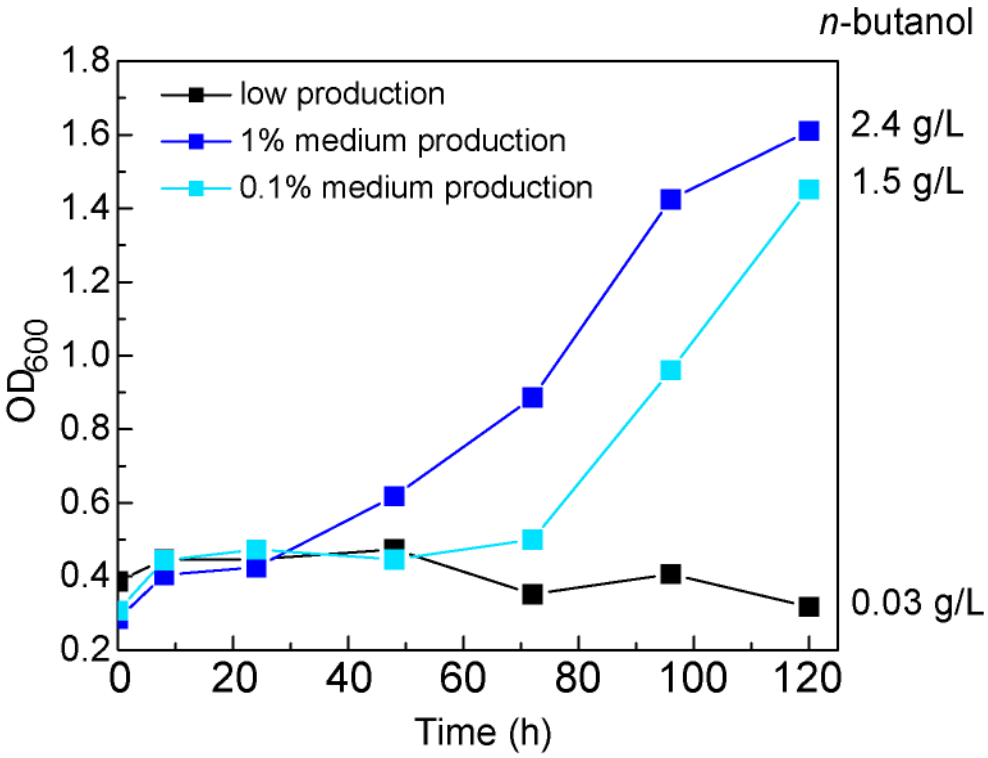


Figure S12. Selection of *n*-butanol strains using EMS mutagenesis under anaerobic conditions. *E. coli* DH1Δ*5* pBBR1-aceEF.lpd and pBT33-Bu2 pCWori.trc-ter-aldh46.adh was treated with EMS for 60 min and then subjected to enrichment in M9 media under anaerobic conditions. A representative evolutionary trajectory is found below. Although improvements were observed, the gain in product titer plateaued within two rounds of mutagenesis. Genome sequencing of genomic DNA isolated from the pool identified ~150 SNPs with 95% overlap, suggesting both that a large number of neutral mutations occurred and that cultures progressed rapidly to genetic homogeneity under the selection conditions. *n*-Butanol titers were measured using GC-MS. Data are mean ± s.d. of biological replicates (n = 3).

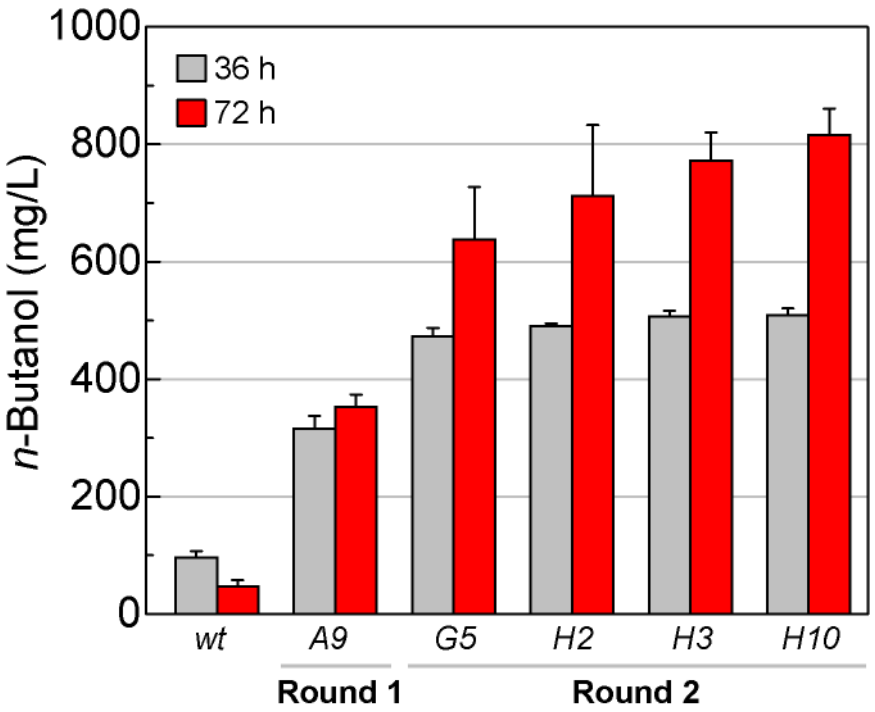
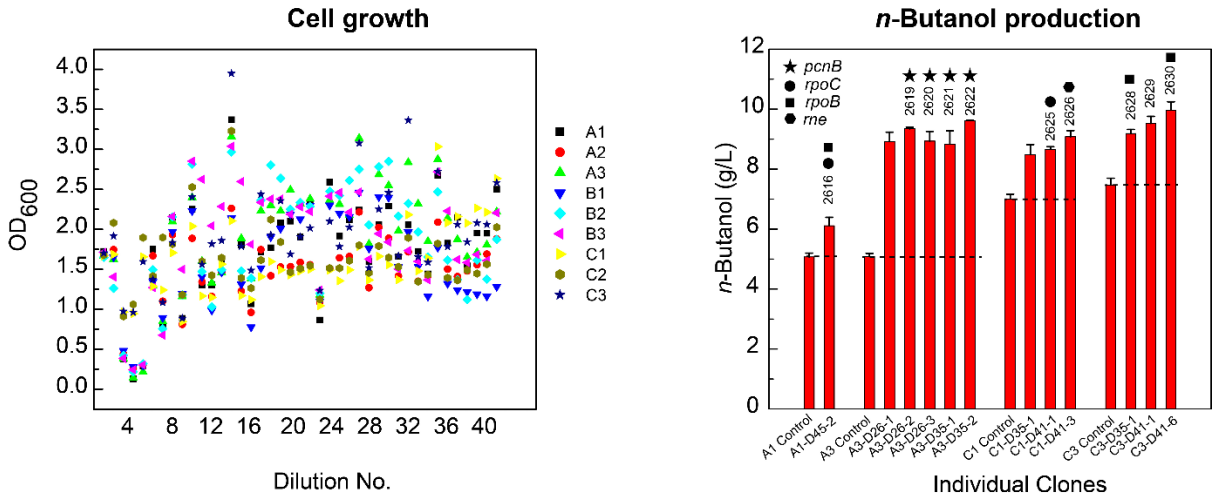
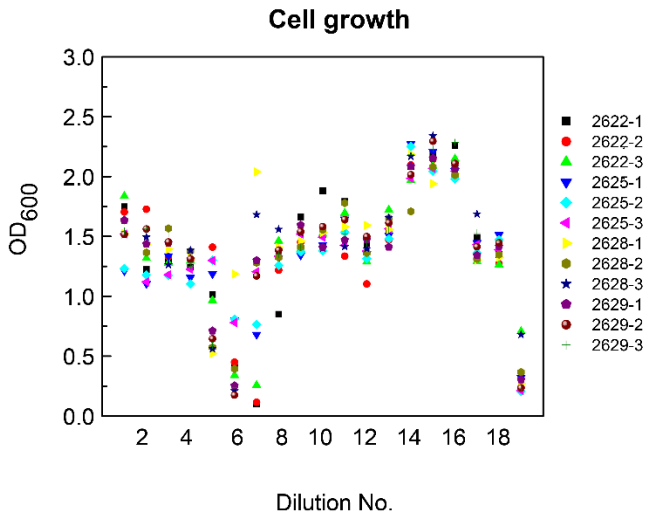


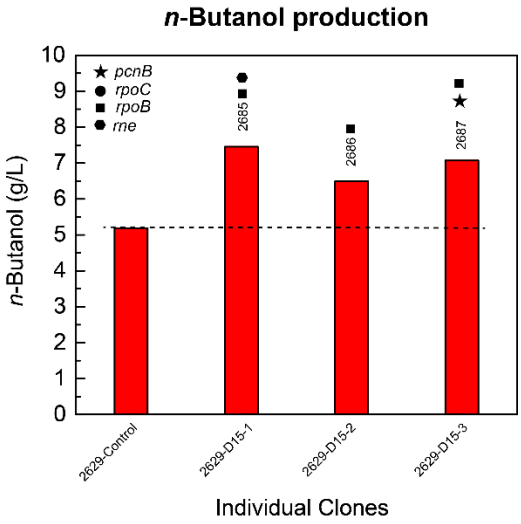
Figure S13. Characterization of adaptive evolution of *n*-butanol strains under anaerobic conditions. All selections were performed in triplicate with cultures supplemented with 2.5% (*w/v*) glucose. OD_{600} for each flask was measured before every dilution. Production titers were validated in the selection media and controls represent *E. coli* parent strains freshly transformed with the appropriate plasmids. Strain labels indicate plasmids/flask-dilution number-clone number. Numbers above bars correspond to a unique identifier number for the sequenced strain with a shape indicating specific genetic loci mutated (*Table S1.A2*). (A) Adaptive evolution with *E. coli* DH1Δ*5* as the host in LB media with three different *n*-butanol pathways. All strains contained the pBBR1-aceEF.lpd and pT5T33-Bu2 plasmids with different downstream plasmids (A, pCWori.trc-ter-aldh46.adh2; B, pCWori.trc-ter-aldh46.adh8; C, pCWori.trc-ter-aldh21.adh2). (B) Adaptive evolution with *E. coli* DH1Δ*5* as the host in M9 media supplemented with 10% LB (*v/v*). The parent strains for this evolution were derived from the selection in LB media: A35-D35-2 (2622), C1-D41-1 (2625), C3-D35-1 (2628), and C3-D41-1 (2629). (C) Adaptive evolution with *E. coli* BW21153Δ*5* as the host in M9 media supplemented with 10% LB (*v/v*). All strains contained the pBBR1-AceEF.Lpd and pT5T33-Bu2 plasmids with different downstream plasmids (A, pCWori.trc-ter-aldh46.adh2; B, pCWori.trc-ter-aldh46.adh8; C, pCWori.trc-ter-aldh21.adh2). (D) Adaptive evolution with various evolved strains in M9 media.

A

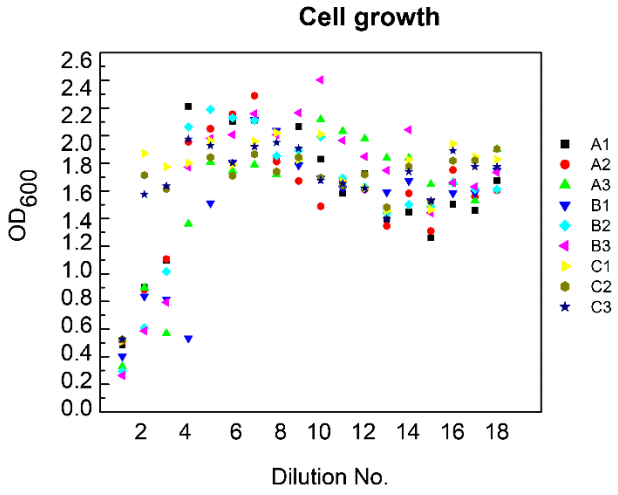


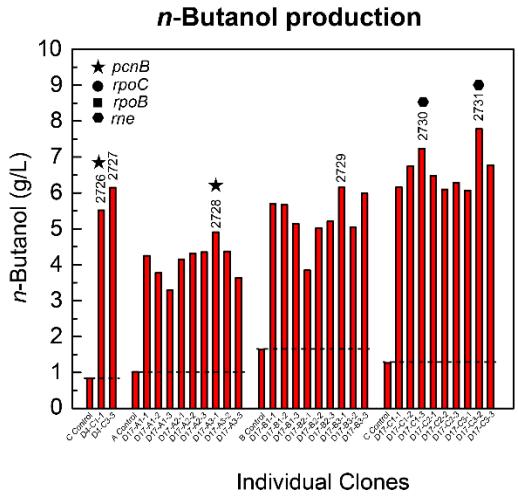
B


Cell growth
OD600
Dilution No.
2622-1
2622-2
2622-3
2625-1
2625-2
2625-3
2628-1
2628-2
2628-3
2629-1
2629-2
2629-3

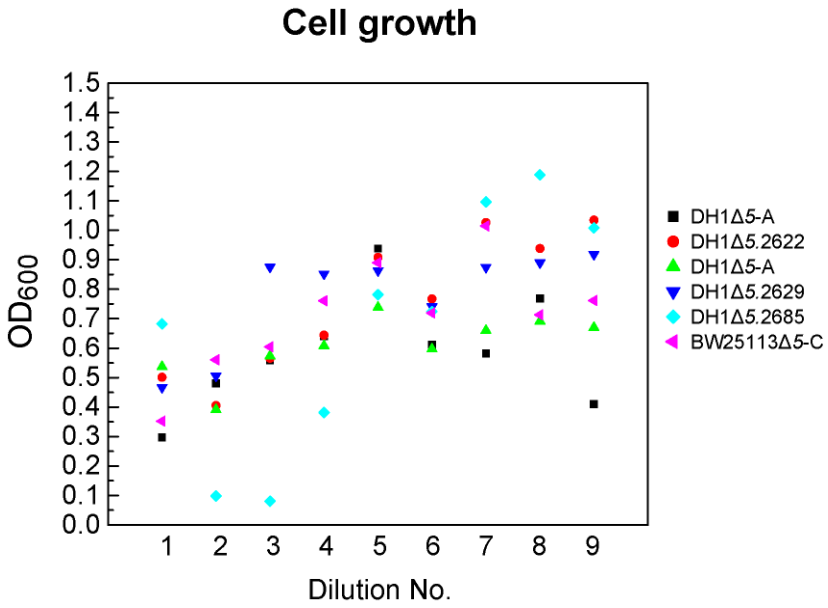

n-Butanol production
n-Butanol (g/L)
pcnB
rpoC
rpoB
rne
2685
2686
2687
2629-Control
2629-D15-1
2629-D15-2
2629-D15-3
Individual Clones

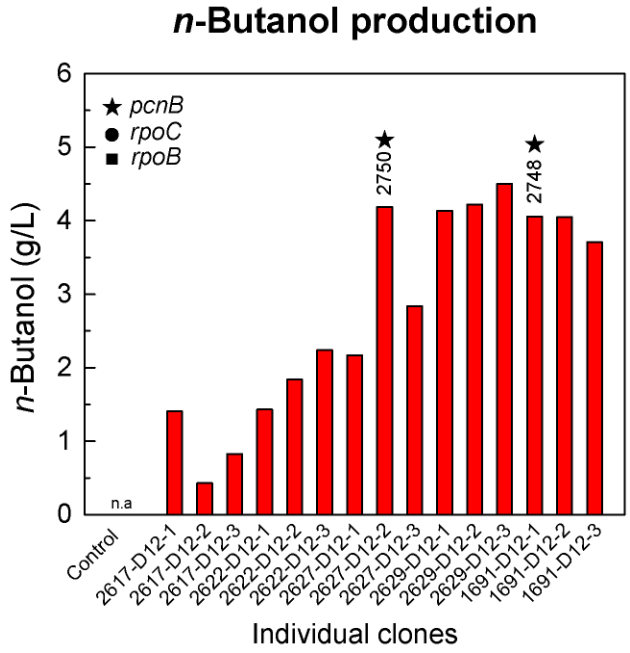
C


Cell growth
OD600
Dilution No.
A1
A2
A3
B1
B2
B3
C1
C2
C3


n-Butanol production
n-Butanol (g/L)
pcnB
rpoC
rpoB
rne
2726
2727
2728
2729
2730
2731
Individual Clones

D

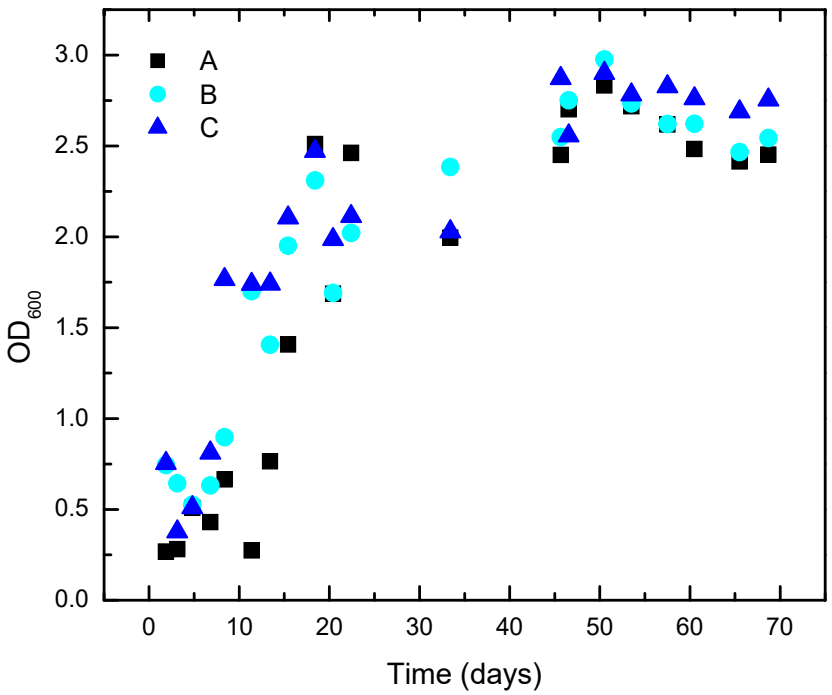




Parent strain	Description	Label
DH1Δ5	Pathway A	2617
DH1Δ5.2622	Isolated Pathway A clone from LB selection (*Figure S14A*: A3-D35-2)	2622
DH1Δ5	Pathway C	2627
DH1Δ5.2629	Isolated Pathway C clone from LB selection (*Figure S14A*: C3-D41-1)	2629
DH1Δ5.2685	Isolated Pathway C clone from M9/LB selection (*Figure S14B*: 2629-D15-1)	2685
BW25113Δ5	Pathway C	1691-C

Figure S14. Characterization of adaptive evolution of BDO and HB strains under anaerobic conditions. All selections were performed in triplicate with TB cultures supplemented with 2.5% (*w/v*) glucose. OD_{600} for each flask was measured before every dilution. Production was validated in the selection media and controls represent *E. coli* parent strains freshly transformed with the appropriate plasmids. Strain labels indicate plasmids/flask-dilution number-clone number. Numbers above bars correspond to a unique identifier number for the sequenced strain with a shape indicating specific genetic loci mutated (*Table S1.A2*). (A) Growth curves of adaptive of HB and BDO evolution with (HB, strain A) DH1Δ*5* pBBR1-aceEF.lpd pT533-phaA pCWori.trc-ter-aldh7.adh2, (BDO, strain B) DH1Δ*5* pBBR1-aceEF.lpd pT533-phaA.phaB pCWori.trc-ter-aldh7.adh2, (BDO, strain C) DH1Δ*5* pBBR1-aceEF.lpd pT533-phaA.phaB pCWori.trc-sadh1-aldh7.adh2. Cultures were grown (B) Control BDO and HB production with plasmids extracted from evolved strains and transformed into a clean parental *E. coli* DH1Δ*5* host. (Strains A, B, and C, see Panel A description; Strain D, DH1Δ*5* pBBR1-aceEF.lpd pT533-phaA.phaB pCWori.trc-aldh3.adh22). The similar production compared to fresh plasmids indicates that mutations responsible for increasing product titer are likely found on the chromosome. Strain numbers for evolved strains are indicated above each bar in the figure. Data are mean ± s.d. of biological replicates (n = 3).

A



B

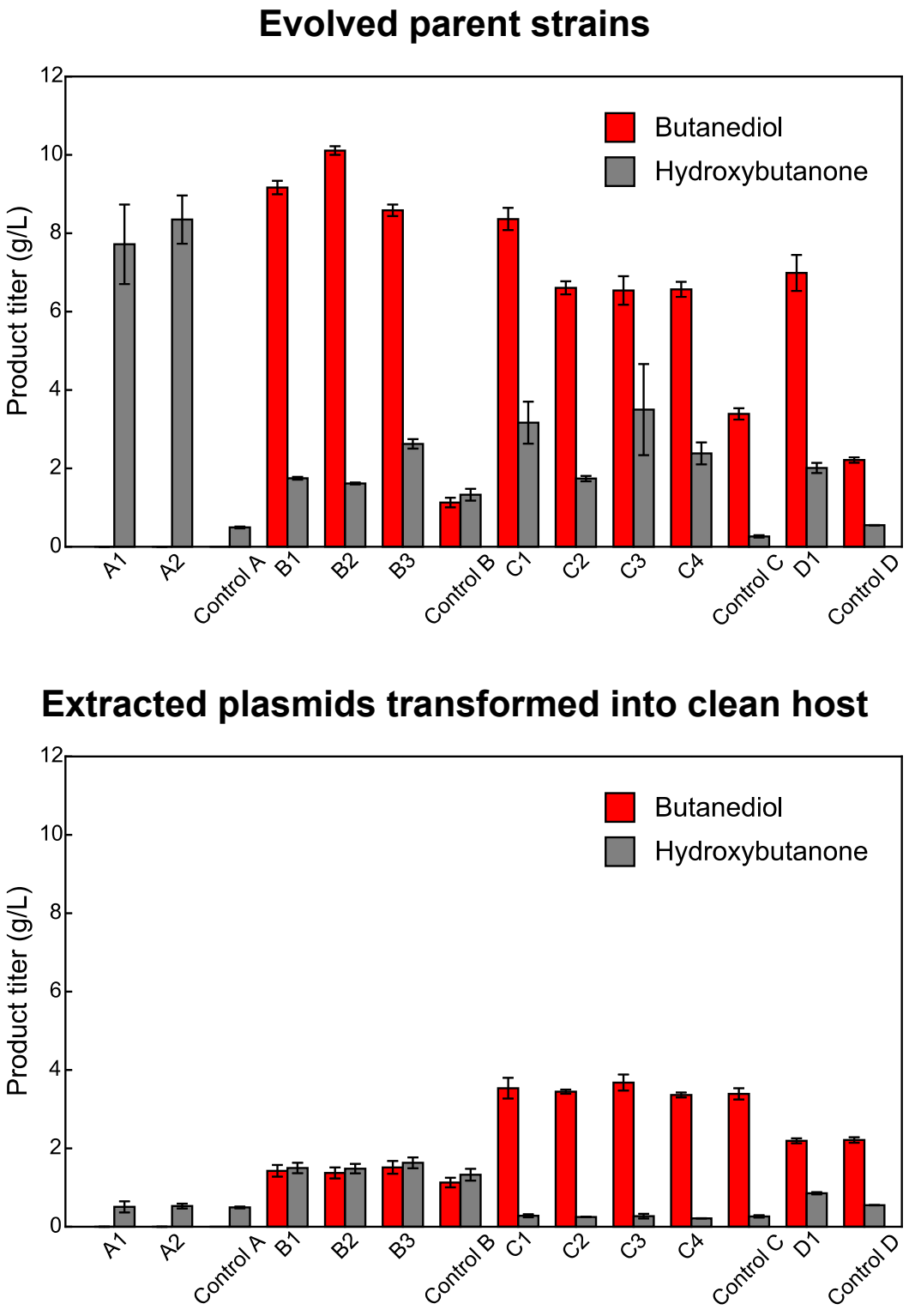
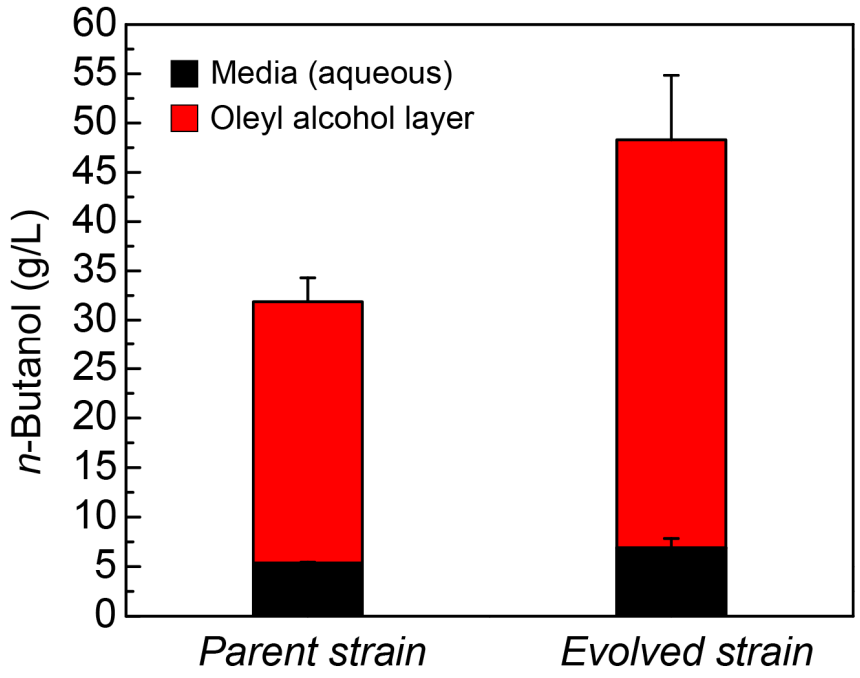

Evolved parent strains
Product titer (g/L)
Butanediol
Hydroxybutanone
0
2
4
6
8
10
12
A1
A2
Control A
B1
B2
B3
Control B
C1
C2
C3
C4
Control C
D1
Control D
Extracted plasmids transformed into clean host
Product titer (g/L)
Butanediol
Hydroxybutanone
0
2
4
6
8
10
12
A1
A2
Control A
B1
B2
B3
Control B
C1
C2
C3
C4
Control C
D1
Control D

Figure S15. Production titers of C4 monomers compared to parent strains. Production titers in the parent DH1Δ*5* strain compared to the evolved DH1Δ*5*.2622 strains both bearing the production plasmids pBBR1-aceEF.lpd pT5T33-Bu2 pCWori.trc-ter-aldh46.adh2 plasmids. Cells were cultured in TB media supplemented with 8% (*w/v*) glucose with a 20% (*v/v*) oleyl alcohol overlay. Data are mean ± s.d. of biological replicates (n = 3). (A) *n*-Butanol production by DH1Δ*5*.2622 pBBR1-aceEF.lpd pT5T33-Bu2 pCWori.trc-ter-aldh46.adh2 compared to the parental strain. The theoretical yield for this experiment is 37.6 g L^{-1}, indicating that the evolved strain can utilize carbon sources other than glucose to produce *n*-butanol if it is consumed. (B) HB production in DH1Δ*5*.2403 pBBR1-aceEF.lpd pT5T33-phaA pCWori.trc- aldh7.adh2 and BDO production in DH1Δ*5*.2406 pBBR1-aceEF.lpd pT5T33-phaAB pCWori.trc-sadh1-aldh7.adh2 compared to the parental strains.

A



B

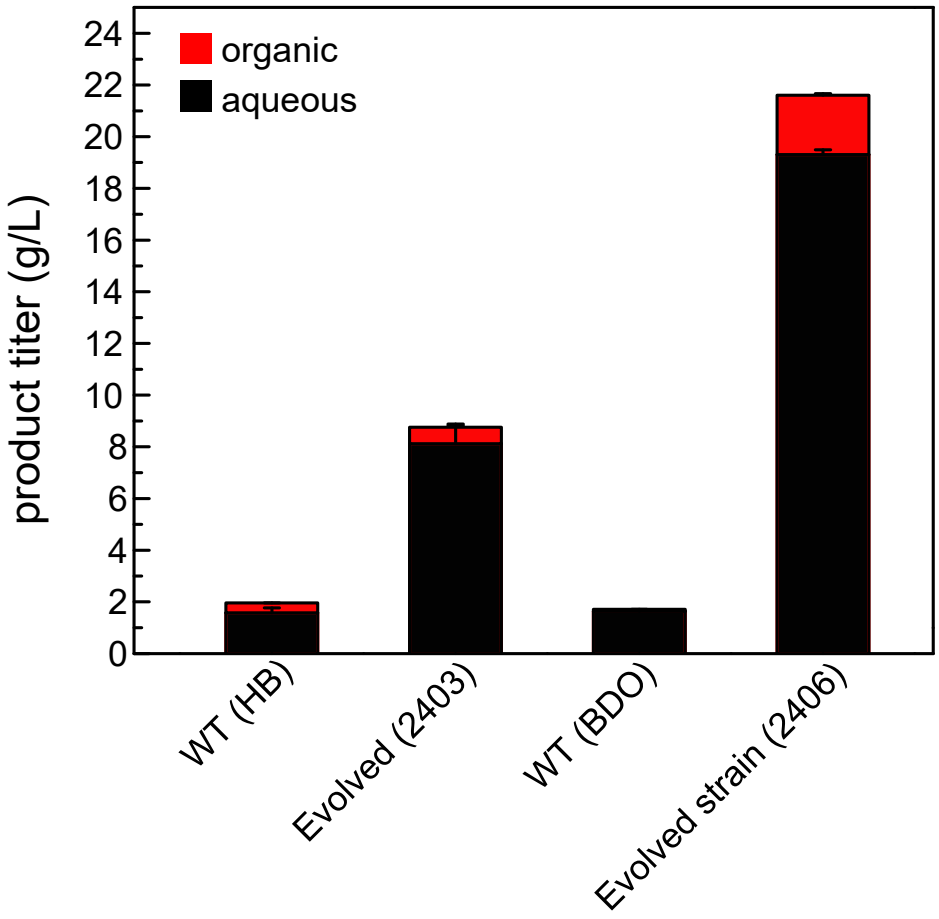

organic
aqueous
product titer (g/L)
0
2
4
6
8
10
12
14
16
18
20
22
24
WT (HB)
Evolved (2403)
WT (BDO)
Evolved strain (2406)

Table S2. Genome sequencing of evolved strains. 31 different evolved strains were sequenced along with the DH1Δ5 or BW25115Δ5 parent strain. Reads were mapped to the reference genome of DH1 or BW25113 and analyzed for changes including SNPs as well as rearrangements using Breseq. (A) Predicted point mutations in the coding region. (B) Predicted point mutations in intergenic regions. (C) Unassigned new junctions evidence. Each new junction consisits of two row, one describing one side of the junction in the reference sequence. (D) Missing coverage evidence. Full tables of differences between parent and evolved strains.

A

Product	Gene	Codon change	Amino acid change	Strain #
4-hydroxy-2-butanone	*pcnB*	GGC → GCC	G141A	2403, 2404
1,3-butanediol	*pcnB*	CGC → CTC	R149L	2406
		CGC → CAC	R149H	2409
		CCT → ACT	P78T	2410
		TTG → TGG	L208W	2411
	rpoC	ATG → CTG	M466L	2405, 2406, 2408
		Δ ACCAAGCGTAAAAAGCTG (634 - 651 nt)	Δ TKRKKL (212 - 217)	2412
	rsmB	CAA → AAA	Q314K	2409
	pyrG	GAT → GAA	D42E	2411
	pspE	TCA → CCA	S14P	
	dcuA	CAG → CCG	Q64P	
	pnp	Δ GGCGATATCTCTGAGTTCGCACCGCGT (1636-1662 nt)	Δ GDISEFAPR (546- 554)	2407
n-butanol	*pcnB*	GAT → GAG	D194E	2619, 2620, 2621, 2622
		GCT → ACT	A98T	2687
		CGC → CCC	R149P	2750
		GAA → GCA	E108A	2748
		AAC → CAC	N138H	2726
		Δ G (1176 nt)	Frame shift after D391	2728
	rpoC	GGT → CGT	G 1161 R	2616
		AAA → GAA	K1192E	2625
	rpoB	GAC → GCC	D199A	2616
		GGC → GTC	G467V	2628, 2630, 2685, 2686, 2687
	rne	CGT → AGT	R373S	2626
		AAA → AAC	K255N	2685
		CGC → CTC	R109L	2730
		CGC → CAC	R488H	2731
	lysP	GTT → GCT	V276A	2685, 2686, 2687
	pnp	ATC → AAC	I541N	2686
	gluQ	add ACG (887 nt)	add S298	2727
	cadB	TGA → AGA	stop 41 R (pseudogene)	2616, 2630, 2685, 2686, 2687

B

Product	Gene	Description	Mutation	Annotation	Position	Strain #
4-hydroxy-2-butanone	ECDH1_10830 / ECDH1_RS10835	hypothetical protein /nad(p) transhydrogenase subunit alpha	+ GGT	intergenic (-38 / -486)	2,200,089	2403, 2404
1,3-butanediol	ECDH1_RS07795 / ECDH1_RS07800	hypothetical protein / nucleoid-associated protein	(T)8 to 9	intergenic (-59 / -123)	1,592,789	2410
n-butanol	ECDH1_RS10460 / ECDH1_RS10465	hypthetical proteion / 4Fe-4S ferredoxin	C to T	intergenic (+146 / -309)	2,123,692	2625
	ECDH1_RS21465 / rrf	UDP-N-acetylenolpyruvoyglucosamine reductase / 5S ribomsal RNA	C to T	intergenic (-276 / +27)	4,342,689	2625
	rrf / ECDH1_RS21275	5S ribosomal RNA / 23S ribosomal RNA	Δ 1 bp	intergenic (-70 / +8)	4,301,498	2630
	BW25113_RS00715 / BW25113_RS00720	polynucleotide adenyltransferase pcnB / tRNA glutamyl-Q(34) synthetase GluQRS	C to T	intergenic (-43 / +50)	155,623	2729

C

Product	Number	Position	Annotation	Gene	Product	Strain
HB	1	2787052	intergenic (-8/-579)	*ECDH1_RS13890/pgaA*	GGDEF domain-containing protein/poly-beta-1,6 N-acetyl-D-glucosamine export porin PgaA	2404
		3970989	intergenic (-39/+14)	*ECDH1_RS19625/ECDH1_RS19630*	tyrosine recombinase/transposase	
	2	2787061	intergenic (-17/-570)	*ECDH1_RS13890/pgaA*	GGDEF domain-containing protein/poly-beta-1,6 N-acetyl-D-glucosamine export porin PgaA	2404
		3850814	intergenic (+252/-249)	*ECDH1_RS19025/ECDH1_RS19030*	30S ribosomal protein S20/transposase	
	3	2991264	intergenic (-234/-36)	*ECDH1_RS14840/ECDH1_RS14845*	hypothetical protein/transporter	2404
		3851581	intergenic (+15/+176)	*ECDH1_RS19030/ECDH1_RS19035*	transposase/transcriptional activator NhaR	
	4	2991272	intergenic (-242/-28)	*ECDH1_RS14840/ECDH1_RS14845*	hypothetical protein/transporter	
		3850814	intergenic (+252/-249)	*ECDH1_RS19025/ECDH1_RS19030*	30S ribosomal protein S20/transposase	2404
BDO	1	1967355	coding (176/213 nt)	*ECDH1_RS09640*	HTH domain-containing protein	2405, 2407
		2200475	intergenic (-424/-100)	*ECDH1_RS10830/ECDH1_RS10835*	hypothetical protein/NAD(P) transhydrogenase subunit alpha	
	2	1968549	pseudogene (3/624 nt)	*ECDH1_RS09650*	DNA-binding transcriptional regulator KdgR	2405, 2407
		2200472	intergenic (-421/-103)	*ECDH1_RS10830/ECDH1_RS10835*	hypothetical protein/NAD(P) transhydrogenase subunit alpha	
	3	1586747	intergenic (+99/-67)	ECDH1_RS07770/ECDH1_RS07775	hypothetical protein/IS5 family transposase	2405
		2568298	coding (291/720 nt)	*ECDH1_RS12695*	protein TonB	
	4	1586746	intergenic (+98/-68)	*ECDH1_RS07770/ECDH1_RS07775*	hypothetical protein/IS5 family transposase	2406
		2200475	intergenic (-424/-100)	*ECDH1_RS10830/ECDH1_RS10835*	hypothetical protein/NAD(P) transhydrogenase subunit alpha	
	5	1776306	intergenic (+146/-481)	*ECDH1_RS08610/ECDH1_RS08615*	IS5 family transposase/phosphogluconate dehydrogenase (NADP(+)-dependent, decarboxylating)	2406
		2200472	intergenic (-421/-103)	*ECDH1_RS10830/ECDH1_RS10835*	hypothetical protein/NAD(P) transhydrogenase subunit alpha	
	6	3970034	intergenic (-120/-94)	*fimA/ECDH1_RS19620*	type-1 fimbrial protein, A chain/hypothetical protein	2406, 2412
		3970348	intergenic (+32/+48)	*ECDH1_RS19620/ECDH1_RS19625*	hypothetical protein/tyrosine recombinase	
	7	3970042	intergenic (-128/-86)	*fimA/ECDH1_RS19620*	type-1 fimbrial protein, A chain/hypothetical protein	2406, 2412
		3970338	intergenic (+22/+58)	*ECDH1_RS19620/ECDH1_RS19625*	hypothetical protein/tyrosine recombinase	
	8	2200472	intergenic (-421/-103)	*ECDH1_RS10830/ECDH1_RS10835*	hypothetical protein/NAD(P) transhydrogenase subunit alpha	2408
		2449684	intergenic (-2/-68)	*ECDH1_RS12040/ECDH1_RS12045*	enterobacterial AI/LOm family protein/IS5 family transposase	
	9	2200475	intergenic (-424/-100)	*ECDH1_RS10830/ECDH1_RS10835*	hypothetical protein/NAD(P) transhydrogenase subunit alpha	2408
		2450879	pseudogene (211/216 nt)	*ECDH1_RS12050*	enterobacterial AI/LOm family protein	
	10	3872608	coding (20/141 nt)	*ECDH1_RS19135*	hypothetical protein	2409
		4006344	coding (265/267 nt)	*ECDH1_RS19830*	transposase	
	11	3872612	coding (16/141 nt)	*ECDH1_RS19135*	hypothetical protein	2409
		4005127	coding (265/369 nt)	*ECDH1_RS19820*	transposase	
	12	2668860	pseudogene (5/345 nt)	*ECDH1_RS13215*	hypothetical protein	2410, 2411
		2670689	coding (289/789 nt)	*ECDH1_RS13230*	integrase	
	13	2668875	pseudogene (20/345 nt)	*ECDH1_RS13215*	hypothetical protein	2410, 2411
		2670672	coding (306/789 nt)	*ECDH1_RS13230*	integrase	
	14	1776305	intergenic (+145/-482)	*ECDH1_RS08610/ECDH1_RS08615*	IS5 family transposase/phosphogluconate dehydrogenase (NADP(+)-dependent, decarboxylating)	2410
		2568303	coding (286/720 nt)	*ECDH1_RS12695*	protein TonB	
	15	1771774	coding (946/1167 nt)	*ECDH1_RS08585*	O-antigen polymerase	2411
		1775112	pseudogene (447/450 nt)	*ECDH1_RS08605*	rhamnosyltransferase	
n-butanol	1	1361359	intergenic (+30/+170)	*ECDH1_RS06715/ECDH1_RS06720*	sensor domain-containing phosphodiesterase/IS4 family transposase	2616
		1998641	coding (112/360 nt)	*ECDH1_RS09820*	hypothetical protein	
	2	1362696	intergenic (-55/+32)	*ECDH1_RS06720/ECDH1_RS06725*	IS4 family transposase/nucleoside permease NupC	2616
		1998651	coding (122/360 nt)	*ECDH1_RS09820*	hypothetical protein	
	3	3970034	intergenic (-120/-94)	*fimA/ECDH1_RS19620*	type-1 fimbrial protein, A chain/hypothetical protein	2616, 2619, 2620, 2621, 2622, 2628, 2630, 2686, 2687
		3970348	intergenic (+32/+48)	*ECDH1_RS19620/ECDH1_RS19625*	hypothetical protein/tyrosine recombinase	
	4	3970042	intergenic (-128/-86)	*fimA/ECDH1_RS19620*	type-1 fimbrial protein, A chain/hypothetical protein	2616, 2619, 2620, 2621, 2622, 2628, 2630, 2686, 2687
		3970338	intergenic (+22/+58)	*ECDH1_RS19620/ECDH1_RS19625*	hypothetical protein/tyrosine recombinase	
	5	2668860	pseudogene (5/345 nt)	*ECDH1_RS13215*	hypothetical protein	2620, 2626, 2687, 2750
		2670689	coding (289/789 nt)	*ECDH1_RS13230*	integrase	
	6	2668875	pseudogene (20/345 nt)	*ECDH1_RS13215*	hypothetical protein	2620, 2626, 2687, 2650
		2670672	coding (306/789 nt)	*ECDH1_RS13230*	integrase	
	7	3971755	intergenic (-249/+491)	*ECDH1_RS19630/ECDH1_RS19635*	transposase/tyrosine recombinase	2620
		3978093	coding (698/1017 nt)	*ECDH1_RS19665*	hypothetical protein	
	8	300335	coding (391/417 nt)	*ECDH1_RS01430*	hypothetical protein	2626
		1606068	coding (66/1557 nt)	*ECDH1_RS07850*	protein Rtn	
	9	1606076	coding (58/1557 nt)	*ECDH1_RS07850*	protein Rtn	2626
		3851581	intergenic (+15/+176)	*ECDH1_RS19030/ECDH1_RS19035*	transposase/transcriptional activator NhaR	
	10	3203305	coding (400/1428 nt)	*ECDH1_RS15885*	HscC co-chaperone, uncharacterized J domain-containing protein	2626
		3577068	intergenic (+146/-287)	*ECDH1_RS17700/ECDH1_RS17705*	IS5 family transposase/hypothetical protein	
	11	4075591	coding (508/939 nt)	ECDH1_RS20165	hypothetical protein	2628, 2630, 2685, 2686, 2687
		4079177	pseudogene (1938/1959 nt)	*ECDH1_RS20175*	2',3'-cyclic-nucleotide 2'-phosphodiesterase	
	12	4079177	pseudogene (1938/1959 nt)	*ECDH1_RS20175*	2',3'-cyclic-nucleotide 2'-phosphodiesterase	2628
		4154154	coding (1508/1539 nt)	*ECDH1_RS20595*	transcriptional regulator	
	13	4079944	intergenic (+15/+144)	*ECDH1_RS20180/ECDH1_RS20185*	transposase/HxlR family transcriptional regulator	2628
		4154146	coding (1500/1539 nt)	*ECDH1_RS20595*	transcriptional regulator	
	14	3505052	coding (403/3075 nt)	*lacZ*	beta-galactosidase	2630
		3505061	coding (412/3075 nt)	*lacZ*	beta-galactosidase	
	15	3503661	coding (94/960 nt)	lacI	lac repressor	2686
		3503728	coding (161/960 nt)	*lacI*	lac repressor	
	16	2678611	intergenic (+1/+29)	*ECDH1_RS13290/ECDH1_RS13295*	integrase/transposase	2750
		3044783	intergenic (-15/+126)	*ECDH1_RS15080/ECDH1_RS15085*	dehydrogenase/DNA-binding protein YbiB	
	17	360753	coding (868/960 nt)	*lacI*	lac repressor	2726, 2729, 2730
		360815	coding (806/960 nt)	*lacI*	lac repressor	
	18	1203246	coding (290/630 nt)	*BW25113_RS05990*	hypothetical protein	2728, 2729
		1205075	intergenic (-6/-66)	*BW25113_RS06005/BW25113_RS06010*	phage tail protein/DNA-invertase from lambdoid prophage e14	
	19	361460	coding (161/960 nt)	*lacI*	lac repressor	2729
		361540	coding (81/960 nt)	*lacI*	lac repressor	
	20	1203261	coding (305/630 nt)	*BW25113_RS05990*	hypothetical protein	2729
		1205058	coding (12/495 nt)	*BW25113_RS06005*	phage tail protein	
	21	376716	coding (28/444 nt)	*BW25113_RS01855*	transferase	2730
		563704	intergenic (+1/-67)	BW25113_RS02785/BW25113_RS02790	protein ren/multidrug SMR transporter	
	22	563698	pseudogene (208/213 nt)	*BW25113_RS02785*	protein ren	2730
		1462169	pseudogene (2521/2526 nt)	*BW25113_RS07350*	hypothetical protein	
	23	3313550	coding (1315/1518 nt)	*BW25113_RS16450*	phosphate starvation-inducible protein PsiE	2730
		3576788	coding (391/417 nt)	*BW25113_RS17825*	hypothetical protein	
	24	3313557	coding (1308/1518 nt)	*BW25113_RS16450*	phosphate starvation-inducible protein PsiE	2730
		3577555	intergenic (+15/-564)	*BW25113_RS17830/BW25113_RS17835*	transposase/heat-shock protein	
	25	3179456	intergenic (+132/-90)	*BW25113_RS15795/BW25113_RS15800*	fimbrial-like adhesin protein/transposase	2748
		3995194	coding (409/951 nt)	*BW25113_RS19815*	magnesium transporter CorA	
	26	3995189	coding (404/951 nt)	*BW25113_RS19815*	magnesium transporter CorA	2748
		4489328	intergenic (+11/+166)	*BW25113_RS22180/BW25113_RS23025*	integrase/phosphoethanolamine transferase YjpX	

D

Product	Start	End	Size		Gene	Strain
BDO	1702686–1703700	1771773	68074–69088	*[ECDH1_RS08295]–[ECDH1_RS08585]*	*[ECDH1_RS08295], ECDH1_RS08300, ECDH1_RS08305, ECDH1_RS08310, ECDH1_RS08315, ECDH1_RS08320, ECDH1_RS08325, ECDH1_RS08330, ECDH1_RS08335, ECDH1_RS08340, ECDH1_RS08350, ECDH1_RS08355, ECDH1_RS08360, ECDH1_RS08365, ECDH1_RS08370, ECDH1_RS08375, ECDH1_RS08380, ECDH1_RS08385, ECDH1_RS08390, ECDH1_RS08395, ECDH1_RS08400, ECDH1_RS08405, ECDH1_RS08410, ECDH1_RS08415, ECDH1_RS08420, ECDH1_RS08425, ECDH1_RS08430, ECDH1_RS08435, ECDH1_RS08440, ECDH1_RS08445, ECDH1_RS08450, ECDH1_RS08455, ECDH1_RS08460, ECDH1_RS08465, ECDH1_RS08470, ECDH1_RS08475, ECDH1_RS08480, ECDH1_RS08485, ECDH1_RS08490, ECDH1_RS08495, ECDH1_RS08500, ECDH1_RS08505, ECDH1_RS08510, ECDH1_RS08515, ECDH1_RS08520, ECDH1_RS08525, ECDH1_RS08530, ECDH1_RS08535, ECDH1_RS08540, ECDH1_RS08545, ECDH1_RS08550, ECDH1_RS08555, ECDH1_RS08560, ECDH1_RS08565, ECDH1_RS08570, ECDH1_RS08575, ECDH1_RS08580, [ECDH1_RS08585]*	2411

n-butanol	3971196–3971755	3978092	6338–6897	*[ECDH1_RS19630]–[ECDH1_RS19665]*	[ECDH1_RS19630], ECDH1_RS19635, ECDH1_RS19640, ECDH1_RS19645, ECDH1_RS19650, ECDH1_RS19655, ECDH1_RS19660, [ECDH1_RS19665]	2620
	3192268–3193273	3203304	10032–11037	*[ECDH1_RS15835]–[ECDH1_RS15885]*	[ECDH1_RS15835], ECDH1_RS15840, ECDH1_RS15845, ECDH1_RS15850, artP, ECDH1_RS15860, ECDH1_RS15865, ECDH1_RS15870, ECDH1_RS15875, ECDH1_RS15880, [ECDH1_RS15885]	2626
	4075592	4079775–4079178	3587–4184	*[ECDH1_RS20165]–[ECDH1_RS20180]*	[ECDH1_RS20165], ECDH1_RS20170, ECDH1_RS20175, [ECDH1_RS20180]	2228, 2630, 2685, 2686, 2687
	2435616	2436637	1022	*ECDH1_RS11980*	ECDH1_RS11980	2630

Figure S16. Cell lysate enzyme activities of *n*-butanol pathway enzymes for parent and evolved strains. Enzyme activities were measured in cell lysate of parent and evolved strains to examine whether increased heterologous expression of pathway enzymes could the source for increases in *n*-butanol titer. DH1Δ*5*.2616 was compared to its parent, DH1Δ*5* pBBR1-aceEF.lpd pT5T33-Bu2 pCWori.trc-ter-aldh46.adh2. BW25113Δ*5*.2730 was compared to its parent, BW25113Δ*5* pBBR1-aceEF.lpd pT5T33-Bu2 pCWori.trc-ter-aldh21.adh2. There is no significant activity differences for the four enzymes tested between the parent and evolved strains, leading us to conclude that differential pathway enzyme expression is not a major factor. Data are mean ± s.d. of biological replicates (n = 3).

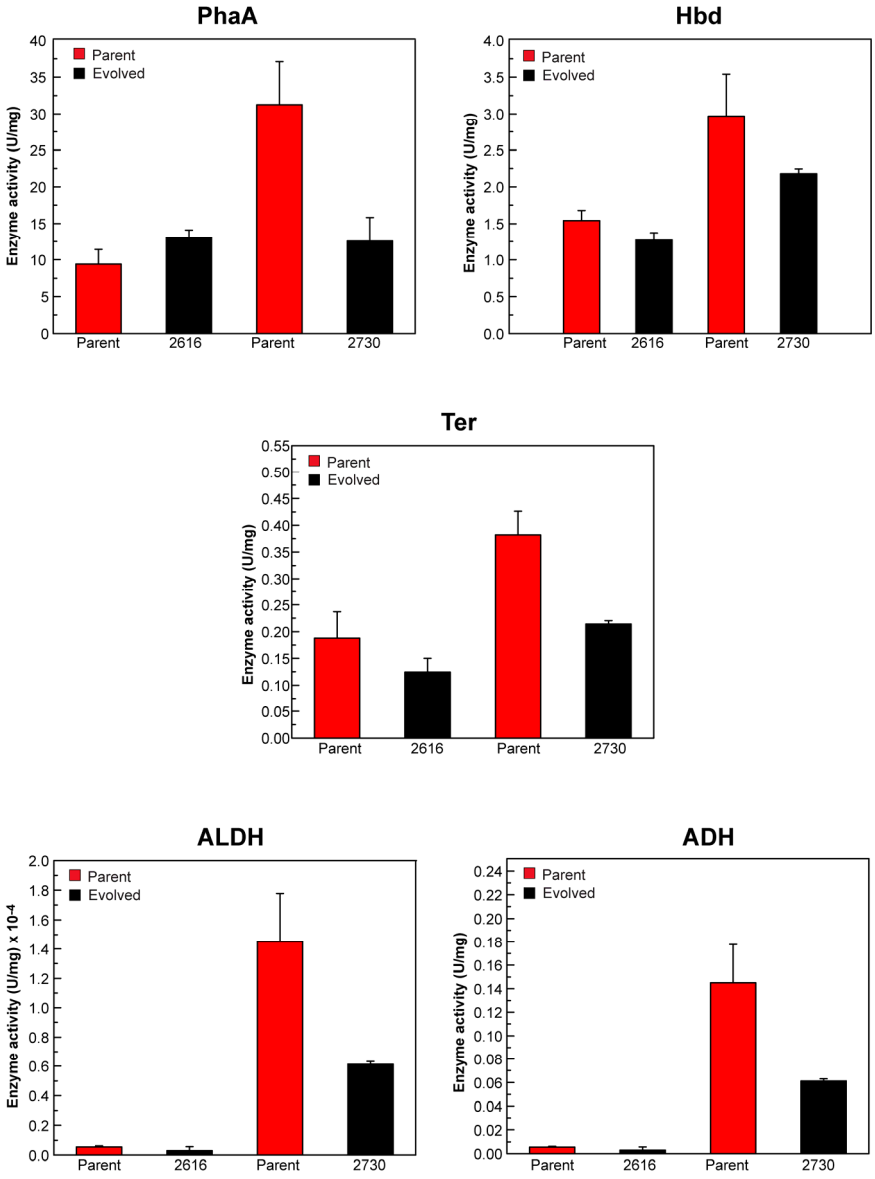


Figure S17. RNA-Sequencing analysis of parent and evolved BDO strains. Volcano plot of RNA sequencing data of the parent DH1Δ*5* pBBR1.aceEF.lpd pT533-phaA.phaB pCWori.trc-ter-aldh7.adh2 compared to the evolved strain (DH1Δ*5*.2406), generated by Sleuth.

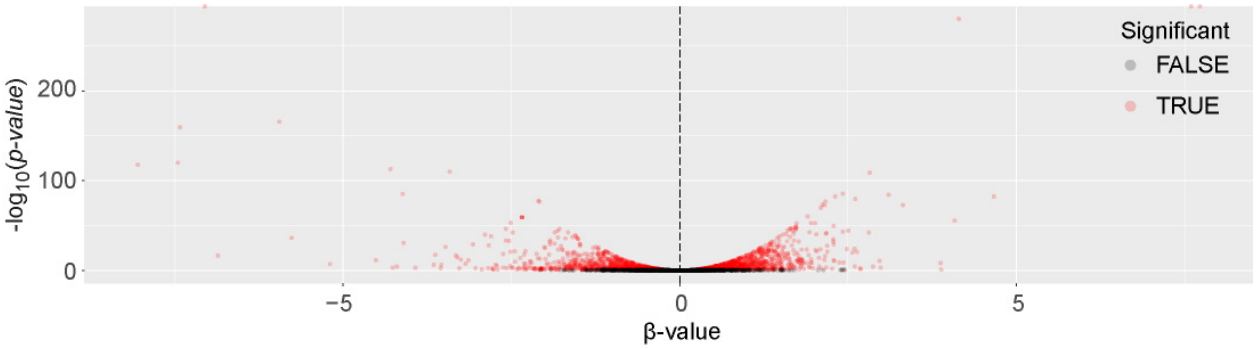
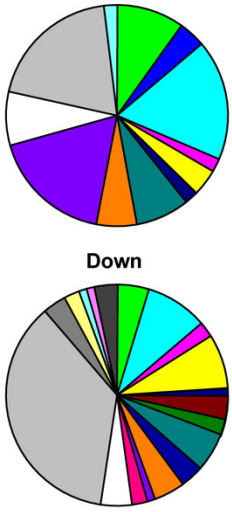


Figure S18. COG analysis of diferentially expressed genes. COG categories were identified by the IMG-ER annotation pipeline. COG categories represented by genes that are upregulated and downregulated 24 h after induction with IPTG. Comparison of COG category representation in the differentially expressed genes compared to the entire genome. The number of open reading frames represented by each COG is given, and the percentage of total genes with COG categories is in parentheses. Since some genes fall into multiple COG categories, the percentage was calculated by dividing the total number of unique genes.



	Function	Genome	Up	Down
A	RNA processing and modification	2 (0.06)	0 (0)	0 (0)
C	Energy production and conversion	260 (7.72)	5 (10.64)	4 (5.06)
D	Cell cycle control, cell division, chromosome partitioning	38 (1.13)	2 (4.26)	0 (0)
E	Amino acid transport and metabolism	354 (10.51)	9 (19.15)	8 (10.13)
F	Nucleotide transport and metabolism	106 (3.15)	1 (2.13)	2 (2.53)
G	Carbohydrate transport and metabolism	380 (11.28)	2 (4.26)	7 (8.86)
H	Coenzyme transport and metabolism	179 (5.31)	0 (0)	0 (0)
I	Lipid transport and metabolism	123 (3.65)	1 (2.13)	1 (1.27)
J	Translation, ribosomal structure and biogenesis	227 (6.74)	0.00	0.00
K	Transcription	292 (8.67)	0.00	3 (3.80)
L	Replication, recombination and repair	137 (4.07)	0.00	2 (2.53)
M	Cell wall/membrane/envelope biogenesis	240 (7.12)	4 (8.51)	5 (6.33)
N	Cell motility	106 (3.15)	0 (0)	3 (3.80)
O	Posttranslational modification, protein turnover, chaperones	149 (4.42)	3 (6.38)	4 (5.06)
P	Inorganic ion transport and metabolism	207 (6.14)	9 (19.15)	1 (1.27)
Q	Secondary metabolites biosynthesis, transport and catabolism	57 (1.69)	0 (0)	2 (2.53)
R	General function prediction only	262 (7.78)	4 (8.51)	4 (5.06)
S	Function unknown	203 (6.03)	10 (21.28)	32 (40.51)
T	Signal transduction mechanisms	189 (5.61)	0 (0)	3 (3.80)
U	Intracellular trafficking, secretion, and vesicular transport	53 (1.57)	0 (0)	2 (2.53)
V	Defense mechanisms	88 (2.61)	1 (2.13)	1 (1.27)
W	Extracellular structures	32 (0.95)	0 (0)	1 (1.27)
X	Mobilome: prophages, transposons	60 (1.78)	0 (0)	3 (3.80)
	Total	**3369**	**47**	**79**

Figure S19. Acetyl-CoA pool analysis between parent, mutant, and the evolved strain. Biomass was harvested after 24 h growth under anaerobic conditions after IPTG induction. Metabolites were extracted using freeze and thaw cycles and supernatants were ran on LC-MS/MS for acetyl-CoA quantification. Data showed introducing the *pcnB* and *rpoC* mutations found in DH1Δ*5*.2406 in a clean genetic background (DH1Δ*5* parent) resulted in a ~2 fold increased in acetyl-CoA pool compared to the parent strain, which captures the same phenotype observed in the evolved strain. All three hosts carried pT533-phaA.phaB, pCWori.trc-aldh7.adh2, and pBBR1-aceE.F.lpd. Parent: DH1Δ*5;* PcnB_R149L RpoC_M466L: DH1Δ*5* _2406_*pcnB*(R149L)_*rpoC*(M466L); Evolved strain : DH1Δ*5*.2406. Data are mean ± s.d. of biological replicates (n = 5).

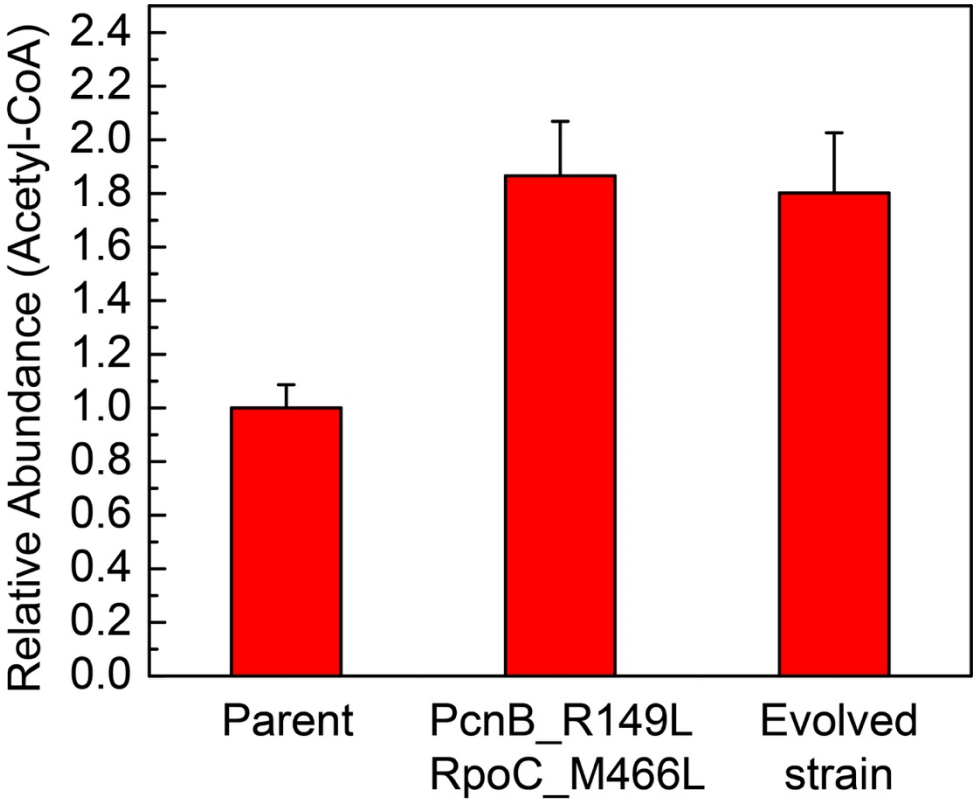


Figure S20. GO enrichment of diferentially expressed genes. Enrichment of GO terms among genes differentially expressed between the parent (DH1Δ*5* pT533-phaA.phaB pCWori.trc-ALDH7.ADH2) and evolved BDO strain (DH1Δ*5*.2406). The number of genes belonging to each enriched GO term is listed in addition to fold enrichment (FE) and false discovery rate (FDR). Downregulated and upregulated genes were analyzed separately.

Downregulated

GO	Biological Process	#	FE	FDR
GO:0006412	Translation	28	2.65	1×10^{-3}
GO:0006520	Cellular amino acid metabolic process	59	2.3	9×10^{-6}
GO:0009117	Nucleotide metabolic process	27	2.14	2×10^{-2}
GO:0006950	Response to stress	31	1.97	3×10^{-2}

Upregulated

GO	Biological Process	#	FE	FDR
GO:0006810	Transport	82	1.95	1×10^{-4}

References

1. Datsenko, K. A. and Wanner, B. L. One-step inactivation of chromosomal genes in *Escherichia coli* K-12 using PCR products. *Proc. Natl. Acad. Sci. U. S. A.* **97**, 6640-6645 (2009).
2. Zhou, S., Shanmugam, K.T., Yomano, L.P. Grabar, T. P., and Ingram, L. O. Fermentation of 12% (w/v) Glucose to 1.2 M Lactate by *Escherichia coli* Strain SZ194 using mineral salts medium. *Biotechnol. Lett.* **28**, 663–670 (2006).
3. Jantama, K., Haupt, M. J., Svoronos, S. A., Zhang, X., Moore, J. C., Shanmugam, K. T., and Ingram, L. O., Combining metabolic engineering and metabolic evolution to develop nonrecombinant strains of *Escherichia coli* C that produce succinate and malate. *Biotechnol. Bioeng.* **99**, 1140-1153 (2008).
4. Gibson, D. G. *et al.* Enzymatic assembly of DNA molecules up to several hundred kilobases. *Nat. Methods* **6**, 343–345 (2009).
5. Engler, C. and Marillonnet, S. Golden Gate cloning. *Methods Mol Biol* **1116**, 119–131 (2014).
6. Bond-Watts, B. B., Bellerose, R. J., and Chang, M. C. Y. Enzyme mechanism as a kinetic control element for designing synthetic biofuel pathways. *Nat. Chem. Biol.* **7**, 222–227 (2011).
7. Chung, C. C. *et al.* A fluorescence-based thiol quantification assay for ultra-high-throughput screening for inhibitors of coenzyme A production. *Assay Drug Dev. Technol.* **6**, 361–374 (2008).
8. Deatherage, D. E., and Barrick, J. E. Identification of mutations in laboratory-evolved microbes from next-generation sequencing data using breseq. *Methods Mol Biol* **1151**, 165–188 (2014).
9. Davis, J. T. *et al.* Biosynthetic thiolase from *Zoogloea ramigera*. I. Preliminary characterization and analysis of proton transfer reaction. *J. Biol. Chem.* **262**, 82–9 (1987).
10. Bray, N. L., Pimentel, H., Melsted, P., and Pachter, L. Near-optimal probabilistic RNA-seq quantification. *Nat. Biotechnol.* **34**, 525–527 (2016).
11. Pimentel, H., Bray, N. L., Puente, S., Melsted, P., and Pachter, L. Differential analysis of RNA-seq incorporating quantification uncertainty. *Nat. Methods* **14**, 687–690 (2017).
12. Markowitz, V. M. *et al.* IMG: The Integrated Microbial Genomes database and comparative analysis system. *Nucleic Acids Res.* **40**, D115-22 (2012).
13. Thomas, P. D., Ebert, D., Muruganujan, A., Mushayahama, T., Albou, L.-P. & Mi, H. PANTHER: Making genome-scale phylogenetics accessible to all. *Protein Science* **31,** 8–22 (2022).
14. Mi, H., Muruganujan, A., Huang, X., Ebert, D., Mills, C., Guo, X. & Thomas, P. D. Protocol Update for Large-scale genome and gene function analysis with PANTHER Classification System (v.14.0). Nat Protoc 14, 703–721 (2019).
15. Jiang, W., Bikard, D., Cox, D., Zhang, F., and Marraffini, L. A. RNA-guided editing of bacterial genomes using CRISPR-Cas systems. *Nat. Biotechnol.* **31**, 233–239 (2013).

16. Chen, W., Zhang, Y., Yeo, W.-S., Bae, T., and Ji, Q. Rapid and Efficient genome editing in *Staphylococcus aureus* by using an engineered CRISPR/Cas9 system. *J. Am. Chem. Soc.* **139**, 3790–3795 (2017).
17. Long, J. Z. *et al.* Ablation of PM20D1 reveals N-acyl amino acid control of metabolism and nociception. *Proc. Natl. Acad. Sci. U. S. A.* **115**, E6937-E6945 (2018).
18. Toth, J., Ismaiel, A. A., and Chen, J.-S. The *ald* gene, encoding a coenzyme A-acylating aldehyde dehydrogenase, distinguishes *Clostridium beijerinckii* and two other solvent-producing Clostridia from *Clostridium acetobutylicum*. *Appl. Environ. Microbiol.* **65**, 4973–4980 (1999).
19. Yan, R. T., and Chen, J. S. Coenzyme A-acylating aldehyde dehydrogenase from *Clostridium beijerinckii* NRRL B592. *Appl. Environ. Microbiol.* **56**, 2591–2599 (1990).
20. Luo, L. H. *et al.* Identification and characterization of the propanediol utilization protein PduP of *Lactobacillus reuteri* for 3-hydroxypropionic acid production from glycerol. *Appl. Microbiol. Biotechnol.* **89**, 697–703 (2010).
21. Hosoi, N., Ozaki, C., Kitamoto, Y., and Ichikawa, Y. Purification and properties of aldehyde dehydrogenase (acylating) from *Propionibacterium freudenreichii*. *J. Ferment. Technol.* **57**, 418–427 (1979).
22. Atsumi, S. *et al.* Metabolic engineering of *Escherichia coli* for 1-butanol production. *Metab. Eng.* **10**, 305–311 (2008).
23. Sánchez, L. B. Aldehyde dehydrogenase (CoA-acetylating) and the mechanism of ethanol formation in the amitochondriate protist *Giardia lamblia*. *Arch. Biochem. Biophys.* **354**, 57–64 (1998).
24. Koo, O. K. *et al.* Cloning and characterization of the bifunctional alcohol/acetaldehyde dehydrogenase gene (adhE) in *Leuconostoc mesenteroides* isolated from kimchi. *Biotechnol. Lett.* **27**, 505–510 (2005).
25. Powlowski, J., Sahlman, L., and Shingler, V. Purification and properties of the physically associated meta-cleavage pathway enzymes 4-hydroxy-2-ketovalerate aldolase and aldehyde dehydrogenase (acylating) from *Pseudomonas* sp. strain CF600. *J. Bacteriol.* **175**, 377–385 (1993).
26. Dellomonaco, C., Clomburg, J. M., Miller, E. N., and Gonzalez, R. Engineered reversal of the β-oxidation cycle for the synthesis of fuels and chemicals. *Nature* **476**, 355–359 (2011).
27. Tang, X., Tan, Y., Zhu, H., Zhao, K., and Shen, W. Microbial conversion of glycerol to 1,3-propanediol by an engineered strain of *Escherichia coli*. *Appl. Environ. Microbiol.* **75**, 1628–1634 (2009).
28. Walter, K. A., Bennett, G. N., and Papoutsakis, E. T. Molecular characterization of two *Clostridium acetobutylicum* ATCC 824 butanol dehydrogenase isozyme genes. *J. Bacteriol.* **174**, 7149–7158 (1992).
29. Zheng, R.-C., Ge, Z., Qiu, Z.-K., Wang, Y.-S., and Zheng, Y.-G. Asymmetric synthesis of (R)-1,3-butanediol from 4-hydroxy-2-butanone by a newly isolated strain *Candida krusei* ZJB-09162. *Appl. Microbiol. Biotechnol.* **94**, 969–976 (2012).
30. Machielsen, R. *et al.* Laboratory evolution of *Pyrococcus furiosus* alcohol dehydrogenase to improve the production of (2S,5S)-hexanediol at moderate temperatures. *Extrem. Life Extreme Cond.* **12**, 587–594 (2008).

31. van der Oost, J. *et al.* Genetic and biochemical characterization of a short-chain alcohol dehydrogenase from the hyperthermophilic archaeon *Pyrococcus furiosus*. *Eur. J. Biochem.* **268**, 3062–3068 (2001).
32. Steinbüchel, A. and Schlegel, H. G. NAD-linked L(+)-lactate dehydrogenase from the strict aerobe *Alcaligenes eutrophus*. 2. Kinetic properties and inhibition by oxaloacetate. *Eur. J. Biochem.* **130**, 329–334 (1983).
33. Lamed, R. J., and Zeikus, J. G. Novel NADP-linked alcohol-aldehyde/ketone oxidoreductase in thermophilic ethanologenic bacteria. *Biochem. J.* **195**, 183–190 (1981).
34. Ismaiel, A. A., Zhu, C. X., Colby, G. D., and Chen, J. S. Purification and characterization of a primary-secondary alcohol dehydrogenase from two strains of *Clostridium beijerinckii*. *J. Bacteriol.* **175**, 5097–5105 (1993).
35. Oda, T. *et al.* Hydrogen-driven asymmetric reduction of hydroxyacetone to (*R*)-1,2-propanediol by *Ralstonia eutropha* transformant expressing alcohol dehydrogenase from *Kluyveromyces lactis*. *Microb. Cell Factories* **12**, 2 (2013).
36. Molinas, S. M. *et al.* The multifunctional isopropyl alcohol dehydrogenase of *Phytomonas* sp. could be the result of a horizontal gene transfer from a bacterium to the trypanosomatid lineage. *J. Biol. Chem.* **278**, 36169–36175 (2003).
37. Steinbüchel, A., and Schlegel, H. G. A multifunctional fermentative alcohol dehydrogenase from the strict aerobe *Alcaligenes eutrophus*: Purification and properties. *Eur. J. Biochem.* **141**, 555–564 (1984).
38. Sutak, R. *et al.* Secondary alcohol dehydrogenase catalyzes the reduction of exogenous acetone to 2-propanol in *Trichomonas vaginalis*. *FEBS J.* **279**, 2768–2780 (2012).
39. Leitsch, D., Williams, C. F., Lloyd, D., and Duchêne, M. Unexpected properties of NADP-dependent secondary alcohol dehydrogenase (ADH-1) in *Trichomonas vaginalis* and other microaerophilic parasites. *Exp. Parasitol.* **134**, 374–380 (2013).
40. Hou, C. T., Patel, R. N., Laskin, A. I., Barist, I., and Barnabe, N. Thermostable NAD-linked secondary alcohol dehydrogenase from propane-grown *Pseudomonas fluorescens* NRRL B-1244. *Appl. Environ. Microbiol.* **46**, 98–105 (1983).
41. García-Quintáns, N., Repizo, G., Martín, M., Magni, C., and López, P. Activation of the diacetyl/acetoin pathway in *Lactococcus lactis* subsp. lactis bv. diacetylactis CRL264 by acidic growth. *Appl. Environ. Microbiol.* **74**, 1988–1996 (2008).
42. González, E. *et al.* Characterization of a (2R,3R)-2,3-butanediol dehydrogenase as the *Saccharomyces cerevisiae* YAL060W gene product. Disruption and induction of the gene. *J. Biol. Chem.* **275**, 35876–35885 (2000).
43. Zhang, H., Lountos, G. T., Ching, C. B., and Jiang, R. Engineering of glycerol dehydrogenase for improved activity towards 1, 3-butanediol. *Appl. Microbiol. Biotechnol.* **88**, 117–124 (2010).
44. Yamada Onodera, K., Nariai, H., Tani, Y., and Yamamoto, H. Gene cloning of dihydroxyacetone reductase from a methylotrophic yeast, *Hansenula ofunaensis*, and its expression in *Escherichia coli* HB101 for production of optically active 2-pentanol. *Eng. Life Sci.* **4**, 418–425 (2004).

45. Yamamoto, H., Kawada, N., and Matsuyama, A. Cloning and expression in *Escherichia coli* of a gene coding for a secondary alcohol dehydrogenase from *Candida parapsilosis*. *Biosci. Biotechnol. Biochem.* **6**, 1051–1055 (1999).
46. Man, H., Loderer, C., Ansorge Schumacher, M. B., and Grogan, G. Structure of NADH-dependent carbonyl reductase (CPCR2) from *Candida parapsilosis* provides insight into mutations that improve catalytic properties. *ChemCatChem* **6**, 1103–1111 (2014).
47. Yang, T. *et al.* Asymmetric reduction of 4-hydroxy-2-butanone to (*R*)-1,3-butanediol with absolute stereochemical selectivity by a newly isolated strain of *Pichia jadinii*. *J Ind Microbiol Biotechnol* **41**, 1743–1752 (2014).
48. Kosjek, B. *et al.* Purification and characterization of a chemotolerant alcohol dehydrogenase applicable to coupled redox reactions. *Biotechnol. Bioeng.* **86**, 55–62 (2004).