Figures SF1. Complete two-dimensional map of nutrient utilization profile for five sequenced Shewanella strains. Only nutrient sources with positive results for at least one strain are depicted: 67 carbon sources (red), 299 nitrogen sources (blue), 55 phosphorous sources (green), and 21 sulfur sources (yellow). Differences in color shade intensities represent differences in metabolic activity of transformed data as follows: black (no activity was detected), light color (below 50 units), dark color (between 50 and 100 units), intense color (above 100 units).
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carbon starvation protein CasA
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conserved hypothetical protein
protein of unknown function DUF682
conserved hypothetical periplasmic protein
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putative type I restriction enzyme EcoE1 M protein
glutathione S-transferase-like protein
ThiJ/PfpI domain protein
protein of unknown function DUF1428
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chitinase
TonB-dependent receptor
methyl-accepting chemotaxis sensory transducer
SEC-C motif domain protein
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two component transcriptional regulator, LuxR family
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sodium:dicarboxylate symporter
amidohydrolase
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phage integrase family protein
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flagellar motor rotation protein, MotA
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lateral flagellar hook-length control protein, Flil
conserved hypothetical protein
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lateral flagellar hook-associated protein, Flig
flagellin protein
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ISPpu12 transposase, TrpA, ISPpu12
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aldehyde dehydrogenase
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Ethanolamine utilization protein EtnN/carboxysome structural protein ComL
propanediol utilization
Propanediol utilization protein
microcompartments protein
propanediol diffusion facilitator, PduF
glycyl-radical enzyme activating protein family
pyruvate formate-lyase
microcompartments protein
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PTS system, mannose-specific IIC component, ManY
PTS system, mannose-specific IIAB component, ManX
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IS1X1-like transposase
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ISPpu2 transposase, TrpA, ISPpu2
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lipoprotein signal peptidase
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hydro-lyases, Fe-S type, tartrate/fumarate subfamily, alpha subunit
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fumarate reductase, membrane anchoring subunit, FndC
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fumarate reductase, flavoprotein subunit, FndA
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W3181_0285
W3181_0305
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methyl-accepting chemotaxis sensory transducer
conserved hypothetical protein
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fumarate hydratase, FumC
outer membrane protein with OmpA domain
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tetrathionate reductase, 4Fe-4S ferredoxin subunit, Trb
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two component response regulator for tetrathionate reductase regulon, TrnA methyl-accepting chemotaxis sensory transducer
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NERD domain protein
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Methionine gamma-lyase
Radical SAM domain protein
Radical SAM domain protein
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cytochrome bd ubiquinol oxidase, subunit
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protein of unknown function DFU1568
ISSpu12-like transposase
rpA family lipoprotein
luciferase family protein
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4Fe-4S ferredoxin, iron-sulfur binding domain protein
aldehyde ferredoxin oxidoreductase
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regulatory protein, ArsR
redox-active disulfide protein 2
hypothetical periplasmic protein
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arsenical pump membrane protein
ATP dependent glutathione synthase, eukaryotic
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UspA domain protein
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 glutamate racemase  
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W3181_0946
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osmosensitive K+ channel signal transduction histidine kinase, KdpD  
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potassium-transporting ATPase subunit B, KdpB  
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Redoxin domain protein
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major facilitator superfamily MFS_1
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negative transcriptional regulator
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| DNA polymerase V subunit, UmuD |
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light metal translocating P-type ATPase
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RND efflux system, outer membrane lipoprotein, NodT family
efflux transporter, RND family, MFP subunit
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IncI-type conjugative transfer system disulfide bond isomerase, HtdT
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IncI-type conjugative transfer system protein, TraW
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RNA-directed DNA polymerase (Reverse transcriptase)
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glutathione S-transferase, N-terminal domain
sec-C metal-binding protein
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phosphoglucomutase/phosphomannomutase alpha/beta/alpha domain
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MR4_0627
protein of unknown function UPF0167
transferase hexapeptide repeat containing protein
UBA/THIF-type NAD/FAD binding protein
two component transcriptional regulator, winged helix family
hypothetical protein
MR4_1329
W3181_1470
MR4_3961
W3181_3329
OsmC-like protein
MR4_0627
phage integrase family protein
phosphoglucomutase/phosphomannomutase alpha/beta/alpha domain
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phage integrase family protein
phosphoglucomutase/phosphomannomutase alpha/beta/alpha domain
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two component transcriptional regulator, winged helix family
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UBA/THIF-type NAD/FAD binding protein
two component transcriptional regulator, winged helix family
hypothetical protein
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conserved hypothetical protein

conserved hypothetical protein  MR4_3892  Sama_0108
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Phospholipase C  Sama_0115  Sama_0116
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efflux transporter, RND family, MFP subunit
acriflavin resistance protein
response regulator receiver protein
Signal transduction histidine kinase-like
hypothetical protein
conserved hypothetical protein  Sama_0147
serine protease, subtilase family
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conserved hypothetical protein  Sama_0151
Sama_0152
response regulator receiver protein
Signal transduction histidine kinase-like
glycosyl hydrolase, family 31/fibronectin type III domain protein
metallo-beta-lactamase family protein
transcriptional regulator, LysR family
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biopolymer transport protein ExbD/TolR
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endonuclease  Sama_0278
conserved hypothetical protein  Sama_0279
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paraquat-inducible protein A family inner membrane protein
sodium/alanine symporter
putative maltose-specific TonB-dependent receptor
alpha-1,8-glucosidases, pullulanase-type
putative alpha-1,2-mannosidase
putative alpha-1,2-mannosidase
N-acetylglucosamine 2-epimerase
fructokinase, ManK
mannose transporter, ManP
alpha-1,2-mannosidase, MnaA
transcriptional regulator of mannose utilization, ManR
TonB-dependent receptor
coagulation factor 5/8 type-like
endo-alpha-mannosidase
N-acetylglucosamine kinase, NagK
Asparaginase
glycoside hydrolase, family 85
CutC
glycoside hydrolase family 2, sugar binding
Na+/solute symporter
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protein of unknown function DUF159
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periplasmic binding protein/LacI transcriptional regulator
extracellular neutral zinc protease, VtpB
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putative phosphoglycerate mutase family protein
putative lipoprotein
response regulator receiver protein
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Subtilisin-like serine proteases-like
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N-acetyltransferase
hypothetical protein
UspA
Zn-dependent protease with chaperone function-like
sodium/proline symporter
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conserved hypothetical protein
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conserved hypothetical protein
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3-oxoacid CoA-transferase
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major facilitator superfamily
hydrolase
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hypothetical protein  
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Microbial collagenase
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response regulator receiver protein
Signal transduction histidine kinase-like
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Sama_1110
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acetyltransferase
Sama_1117
glutathione synthase
Sama_1157
FOG: GGDEF domain-like
Sama_1162
Glutamate-aminoglycine ligase
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Beta-lactamase
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TonB-dependent receptor possibly related to N-acetylgalactosamine utilization
N-acetyl-D-galactosamine utilization
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transcriptional repressor of aga operon, AgaR
N-acetyl-D-galactosamine utilization
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peptidase MA, thermolysin
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Pepidyl-Lys metalloendopeptidase
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outer membrane decaheme cytochrome c, OmcA
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putative uracil-DNA glycosylase
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Sama_1349
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Sama_1350
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Sama_1352
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NAD(P)H dehydrogenase (quinone) TonB-dependent receptor
conserved hypothetical protein
Glucan endo-1,3-beta-D-glucosidase TonB-dependent receptor
b-glucoside-specific TonB-dependent receptor
cellobiose regulator, BglR
cellobiose permease, BglI
beta-glucosidase
TonB-dependent receptor
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cellobiose permease, BglI
glucose permease, GlcP
beta-glucosidase
D-hexose 6-phosphotransferase, HexA
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conserved hypothetical protein
beta-lactamase domain protein
M6 family metalloprotease domain
conserved hypothetical protein
sigma54 specific transcriptional regulator, Fis family
auxin efflux carrier
tetrapeptide TPR_2 repeat protein
dual thioesterase superfamily domain protein
uncharacterized flavoprotein
methyl-accepting chemotaxis protein
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ABC transporter ATP-binding protein
Conserved hypothetical protein
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glutamate-1-semialdehyde 2,1-aminomutase, putative conserved hypothetical protein
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formate transporter with CBS domain
transcriptional regulator, LysR family
cysteine desulfurase
cysteine desulfurase
Response regulator containing a CheY-like receiver domain and a GGDEF domain
Microbial collagenase
fatty aldehyde dehydrogenase
proline racemase
dihydropicolinate synthetase family protein
putative proline racemase
D-amino-acid dehydrogenase
xaa-pro aminopeptidase
hypothetical protein
putative phosphonate ABC transporter, periplasmic phosphonate-binding protein
ABC transporter related
binding-protein-dependent transport systems inner membrane component
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histidine kinase
two component, sigma54 specific, transcriptional regulator, Fis family
diguanylate cyclase
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carbohydrate kinase, FGGY
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prolyl oligopeptidase family protein
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Signal transduction histidine kinase regulating C4-dicarboxylate transport system-like
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conserved hypothetical protein
Flavodoxin reductases (ferredoxin-NADPH reductases) family 1-like
ion transport protein
isosorbatase hydrolase
esterase/lysase/triolesterase family protein
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rhodanese-like protein
thioredoxin, putative
phospohlipase D-family protein
conserved hypothetical protein
peptidase S8 and S53, subtilisin, kexin, sedolisin
UDP-glucose/GDP-mannose dehydrogenase
an dehydroxarbose 3,5-epimerase
dTTP-4-dehydrorhamnose reductase
phosphoglucomamine mutase
sugar O-acetyltransferase, sialic acid O-acetyltransferase, NeuD family
Methionyl-tRNA formyltransferase
capsular polysaccharide synthesis protein
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UDP-3-O-(3-hydroxymyristoyl)-like
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MvM protein
UDP-N-acetylglucosamine 2-epimerase
putative methyl-accepting chemotaxis sensory transducer
polysaccharide biosynthesis protein CapD
PLP-dependent enzyme
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N-acrylneuraminate-9-phosphate synthase
UDP-N-acetylglucosamine 2-epimerase
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putative methyl-accepting chemotaxis sensory transducer
flavocytochrome c flavin subunit
flavocytochrome c, tetraheme subunit
bifunctional signalling protein with PAS and GGDEF domains/diguanylate phosphodiesterase
ISSHam1 transposase, TrpA_ISSHam1
cold-active alkaline serine protease
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Na+/H+ antiporter NhaC
FAD dependent oxidoreductase
acetyltransferase, GNAT family
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transcription regulator, LysR family
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cytochrome b561
response regulator receiver protein
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putative methyl-accepting chemotaxis sensory transducer
transcriptional regulator containing an amidase domain and an AraC-type DNA-binding HTH domain
glutathione S-transferase-like protein
secreted protein containing internal repeats
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TRAP dicarboxylate transporter permease component 2, DotQ
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permease, DMT superfamily
glycerophosphoryl diester phosphodiesterase
DeoR-family transcriptional regulator
major facilitator superfamily MFS_1
Beta-lactamase class C and other penicillin binding proteins-like
P-loop ATPase-like
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response regulator receiver protein
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putative translation initiation protein, SUA5/YciO/YrdC family
FOG: GGDEF domain-like
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metal-dependent phosphohydrolase

glycol-IRNA synthetase, beta subunit, GlyS

glycol-IRNA synthetase, alpha subunit, GlyQ

DNA-3-methyladenine glycosylase 1, Tag

bifunctional TolB-family protein/amidothiolase

MOISC domain protein

IRNA 2-thiouridine synthesizing protein, TusA

fatty oxidation complex, beta subunit, FadA

fatty oxidation complex, alpha subunit, FadB

protease, PepQ

protein of unknown function UPF0029

potassium uptake protein, Tkh

protoporphyrinogen oxidase, HemG_1

transcriptional regulator, ArsR family

protoporphyrinogen oxidase, HemG_2

potassium uptake protein, Tkh1

potassium uptake protein, TrkA

16S rRNA m5C67 methyltransferase, RsmB

methionyl-IRNA formyltransferase, Fmt

peptide deformylase, Def_1

LyEM domain protein

DNA processing protein, DprA

protein of unknown function DUF494, Smg

DNA topoisomerase, type IA, zinc finger domain protein

threoninecarboxylmethyltransferase, ThoJA RNA modification protein, RentN

coproporphyrinogen III oxidase, aerobic, HemF

globin

5-phosphoribosyl-1-pyrophosphate synthetase, AroE

protein of unknown function DUF1488

trimeric LpxA-like enzyme, YrdF

protein of unknown function UPF0153

nitrite-sensitive transcriptional repressor, NsrR

cysteine-specific hypothetical protein, YbiQ

C-terminal serine peptidase, Prc

peptidase, M23 family

phosphoglycerate mutase, cofactor-independent, GpmA

rhomdase domain protein

protein export chaperone, SecB

NAD(ADP)-utilizing dehydrogenase family protein

tetratricopeptide domain-containing protein

ABC-type transporter, periplasmic ligand binding protein

sodium-dependent potassium uptake protein, integral membrane component, KtrB_1

sodium-dependent potassium uptake system, NAD binding component, KtrA_1

two component response regulator for KtrB potassium uptake, KtrE

periplasmic sensor histidine kinase

family C40 peptidase lipoprotein, NlpC

anti-toxin module of toxin-antitoxin system

toxin module of toxin-antitoxin system, HipA family

molybdenum cofactor biosynthesis protein, MobA

alpha2-macroglobulin-like protein

penicillin binding protein 1C, PbpC

conserved hypothetical protein

ABC-2 type sodium transporter, inner membrane subunit, NatB

ABC-2 type sodium transporter, ATPase subunit, NatA

peptidase, S33 family

GlnR transcriptional regulator, Yra subfamily

ABC transporter, ATPase subunit

hypothetical inner membrane protein

long-chain-fatty-acid-CoA ligase

outer membrane moom repeat variant protein

thioesterase superfamily protein

hypothetical lipoprotein

acetyltransferase
proton-glutamate symporter, DAACS family
protection of unknown function
transporter, AbgT family
phosphoenolpyruvate carboxykinase, PckA
redox regulated chaperone, HsO
heat shock protein 15, HspR
general secretion pathway protein, GspC
general secretion pathway protein, GspD
general secretion pathway assembly ATPase, GspE
general secretion pathway inner membrane platform protein, GspF
general secretion pathway pseudoprotein, GspG
general secretion pathway pseudoprotein, GspH
general secretion pathway pseudoprotein, GspI
general secretion pathway pseudoprotein, GspJ
general secretion pathway inner membrane platform protein, GspL
general secretion pathway inner membrane platform protein, GspM
general secretion pathway protein, GspN
HAD-superfamily hydrolase, subfamily IA, variant 3 protein family
aspartyl/asparaginyl beta-hydroxylase family protein
S-adenosyl-L-methionine-dependent methyltransferase
P-loop containing nucleotide triphosphate hydrolase
conserved protein of unknown function
GCN5-related N-acetyltransferase
microcin-dependent MdpB family protein
microcin-dependent MdpB family protein
peptidase, subtilase family
conserved hypothetical protein
outer membrane fibronectin type III/cadherin domain protein
ADP compounds hydrolase, NudE
3-phosphohexenoylmalylate 3-phosphatase, CysG_1
GCN5-related N-acetyltransferase
fatty acid metabolism/phospholipid synthesis transcriptional regulator, TetR family
bifunctional lysophospholipid transporter-2-acetyl glycerophosphocholine acyl transferase/acylACP synthetase
selenophosphate-dependent 2-selenouridine synthase, SelU
selenophosphate synthase, SelD
stearoyl-CoA desaturase, DesD
fatty acid metabolism transcriptional repressor, FabR
ISSod15 transposase, TrpA_ISSod15
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conserved hypothetical periplasmic protein
hypothetical tri-BON domain protein
YD repeat domain protein
RNA (uracil-5')-methyltransferase, TrmA
glutamyl racemase, MurL
RNA-binding protein
ISSod10 transposase, TrpA_ISSod10
UDP-N-acetylenolpyruvylglucosamine reductase, MurB
bifunctional biotin operon repressor(biotin-[acyl-CoA-carboxylase]) ligase, BirA
panthotenate kinase, PanK
translation elongation factor Tu, TuB
preprotein translocase subunit, SecE
transcription antitermination protein, NusG
ribosomal protein L11, RplK
ribosomal protein L1, RplA
ribosomal protein L10, RplJ
ribosomal protein L7/L12, RplL
DNA-directed RNA polymerase, beta subunit, RpoB
DNA-directed RNA polymerase, beta-prime subunit, RpoC
ribosomal protein S12, RpsL
ribosomal protein S7, RpsD
translation elongation factor G, FusA_1
translation elongation factor Tu, TuA
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BON domain lipoprotein
phosphohistidine isomerase, GmhA
conserved hypothetical protein of unknown function UPF0102
outer membrane lipoprotein, LppC
urotropin-Ill/C tetrapyrrole (corrin/porphyrin) methyltransferase family protein
protein of unknown function
type II restriction endonuclease
conserved hypothetical outer membrane protein
conserved hypothetical integral membrane protein
inner membrane MAPEG superfAMILY protein
radical SAM superfamily protein
outer membrane porin
putrescine-ornithine antiporter, PotE
ornithine decarboxylase, SpeF
periplasmic phosphatidylethanolamine-binding protein of unknown function, YbCL
transcriptional regulator, AraC family
conserved hypothetical protein
protein of unknown function DUF1232
inner membrane acyl transferase family 3 protein
putative periplasmic protein of unknown function
conserved secreted protein of unknown function
conserved hypothetical inner membrane protein
nitrosative stress induced protein, YgbA
conserved protein of unknown function, YchN
conserved hypothetical protein
hypothesis lipoprotein
protein of unknown function UPF0061
conserved hypothetical protein
Thr/ser protein kinase, RdoA
periplasmic thiol/disulfide interchange protein, DsbA
sodium-proton antiporter, NhaC family
YER057c/YgFlkUk114 family protein
conserved protein of unknown function
modulator of rho-dependent transcriptional termination, RofA
branched-chain amino acid transaminase, IlvE
multifunctional sensory protein/diguanylate cyclase/signaling protein with EAL domain
2-methyl acconitate cis-trans isomerase, PrPF
2-methyl-4-citrate dehydratase, Fe-S dependent, AcmD
2-methylcitrate synthase, PrpC
2-methylisocitrate lyase, PrpB
propionate dehydrogenase, PrpR
phospholipid:glycerol acyltransferase family protein
phospholipid:glycerol acyltransferase family protein
AAA ATPase family protein
two component transcriptional regulator, LuxR family
periplasmic sensor histidine kinase
TRQ domain protein
sodium:calium antiporter, CaCA family
AMP-dependent synthetase and ligase family protein
ISSo4a transposase, TnpA, ISSo4a
alkyl sulfatase
derodonculase L-PSP
bifunctional ppGpp phosphohydrolase / GTP diphosphokinase, SpoT
DNA-directed RNA polymerase, omega subunit, RpoZ
guanulate kinase, Gmk
conserved domain inner membrane protein
nucleoside-diphosphate-sugar pyrophosphorylase
phosphotransferase enzyme family protein
multidrug efflux protein, MFS superfamily
P-loop containing nucleotide triphosphate hydrolase
Fic family protein  
SO_0367  MR7_0336  W3181_3765

type III restriction enzyme, res subunit  
SO_0368

transcriptional regulator, LysR family  
SO_0369  MR4_3607  MR7_0340  W3181_3761

inner membrane protein of unknown function DUF606  
SO_0370  W3181_0524  Sama_0372

conserved hypothetical integral membrane protein  
SO_0371  W3181_0382

5-prime nucleotide phosphatase, YigG  
SO_0372  MR4_3606  MR7_0341  W3181_3760  Sama_0285

site-specific recombinase, phage integrase family  
SO_0373"  MR4_3607  MR7_0341  W3181_3760  Sama_0285

ISSOD1 transposase, TnpA_ISSOD1  
SO_0375

protein of unknown function DUF45  
SO_0376

type I restriction enzyme, site-specific deoxyribonuclease subunit, HsdR_1  
SO_0380  W3181_0321

Hsd system I death-on-curing family protein  
SO_0381  W3181_0321

type I restriction enzyme, DNA specificity subunit, HsdS_1  
SO_0382  W3181_0317

type I restriction-modification system, site-specific DNA-methyltransferase (adenine-specific) component, HsdM_1  
SO_0383  W3181_0317

conserved domain protein  
SO_0384  W3181_0321

transcriptional regulator, AlpA family  
SO_0384.1

cysteine/glutamyl-transferase inhibitor-like protein  
SO_0385

conserved hypothetical protein  
SO_0387

recombinase, phage integrase family  
SO_0388

hypothetical protein  
SO_0389

exosialinase/response regulator inhibitor-like protein  
SO_0390

conserved hypothetical protein  
SO_0391

type VioL lipoprotein  
SO_0392

type II restriction enzyme, Rho  
SO_0393  MR4_0399  MR7_3626  W3181_0495  Sama_3226

ribosomyl protein L11 methyltransferase, PrmA  
SO_0394  MR4_0400  MR7_3625  W3181_0496  Sama_3226

quinoa-lurate reductase, menaquinol-oxidizing subunit, FrdC_1  
SO_0395  MR4_0401  MR7_3624  W3181_0497  Sama_3224

quinoa-lurate reductase, menaquinol-oxidizing subunit, FrdC_2  
SO_0396  MR4_0402  MR7_3623  W3181_0498  Sama_3222

quinoa-lurate reductase, FAD-binding subunit, FrdA  
SO_0397  MR4_0403  MR7_3622  W3181_0499  Sama_3221

quinoa-lurate reductase, FeS subunit, FrdB  
SO_0398  MR4_0404  MR7_3621  W3181_0500  Sama_3220

ubiquinol oxidase, YgN  
SO_0399  MR4_0405  MR7_3619  W3180_0502  Sama_3219

NADPH:cytochrome c oxidoreductase  
SO_0400  MR4_0406  MR7_3619  W3180_0503  Sama_3219

transcriptional regulator, LysR family  
SO_0401

conserved outer membrane protein  
SO_0402  MR4_0408  MR7_3617  W3180_0504  Sama_3218

zinc-dependent metalloprotease domain lipoprotein  
SO_0403

type I restriction enzyme, Rho  
SO_0404

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acetyl-CoA carboxylase, biotin carboxyl carrier protein, AccB
hypothetical protein
3-octaprenyl-4-hydroxybenzoate carboxy-lyase, UbiD
conserved domain protein
NAD(P)H-flavin reductase, FreD
permease of unknown function DUF318
transcriptional regulator, ArsR family
putative lipoprotein
methyl-accepting chemotaxis protein
ISSod1 transposase, TnpA_ISSod1
flavoprotein oxygenase
transmembrane transcriptional regulator
ABC sulfur transporter, ATPase subunit, NosF
ABC sulfur transporter, periplasmic ligand-binding subunit, NosD
ABC sulfur transporter, ATPase subunit, NosF
transmembrane transcriptional regulator
oligopeptidase lipoprotein, M13 family
flavoprotein oxygenase
ISSod1 transposase, TnpA_ISSod1
DNA helicase II, UvrD
4-hydroxybenzoate octaprenyltransferase, UbiA
hypothetical secreted protein
2-nitropropane dioxygenase
inner membrane protein of unknown function UPF0118
conserved hypothetical protein
protein of unknown function DUF2168
cytochrome c maturation system periplasmic disulfide isomerase
cytochrome c maturation system, haem lyase subunit, Nhf
acytochrome c maturation system, haem lyase subunit, Nrf
periplasmic octaheme cytochrome c, McoA
sulfurtransferase
cytochrome c maturation system peptidyl-prolyl cis-trans isomerase
cytochrome c maturation system haem lyase subunit, NrfG
thiosulfate-inducible Nrf-like 4Fe-4S ferredoxin
thiosulfate-inducible Nrf-like inner membrane reductase
periplasmic copper chaperone, NosL
ABC sulfur transporter, periplasmic ligand-binding subunit, NosD
ABC sulfur transporter, ATPase subunit, NosF
ABC sulfur transporter, inner membrane subunit, NosY
transmembrane transcriptional regulator
oligopeptidase lipoprotein, M13 family
flavoprotein oxygenase
ISSod1 transposase, TnpA_ISSod1
thiolate synthetase ATP-binding domain-like superfamily protein
Ser/Tyr protein kinase
protein of unknown function DUF1568
methyl-accepting chemotaxis protein
putative lipoprotein
transcriptional regulator, ArsR family
permease of unknown function DUF318
NAD(P)H-flavin reductase, FreD
conserved domain protein
3-octaprenyl-4-hydroxybenzoate carboxy-lyase, UbID
hypothetical protein
oxidoreductase, short-chain dehydrogenase/reductase family
acyclo-CoA carboxylase, biotin carboxyl carrier protein, AccB
3-dehydroquinase dehydratase, type II, ArcQ
conserved hypothetical protein, YaeJ
prophage MuSo1 conserved hypothetical protein, E18_1
prophage MuSo1 protein
prophage MuSo1 middle operon regulator, Mor_1
prophage MuSo1 protein unknown function DUF1018, GemA_1
prophage MuSo1 hypothetical protein
prophage MuSo1 transposase, OrfA, TnpA_MuSo1a
alcohol dehydrogenase, zinc-containing
conserved hypothetical protein of unknown function DUF6
phosphatidylycerine decarboxylase, Pdc
ribosome small subunit-stimulated GTPase, RsqA
oligonucleotase, Orn
protein of unknown function
IS504 transposase, TnpA, ISS504
protein of unknown function, YjE
peptidoglycan biosynthesis related ATPase, YjE
N-acetylmuramoyl-L-alanine amidase, AmiB
DNA mismatch repair protein, MutL
RNA delta2-isopenentylpyrophosphate transferase, MiaA
host factor-I protein, Hflq
GTP-binding protein, HKX
inner membrane protein, HKI
inner membrane protein, HIC
ubiquinol-cytochrome c reductase, FeS subunit, PetA
ubiquinol-cytochrome c reductase cytochrome b subunit, PetB
ubiquinol-cytochrome c reductase cytochrome c1 subunit, PetC
transcriptional activator, SapA
stringent starvation protein b, SspB
para-aminobenzoate synthase, glutamine amidotransferase subunit, PatA
peptidase, S9 family
HID domain protein
lipase/esterase
acylsulfonineaminotransferase/succinyl-diaminopimelate aminotransferase/succinylsulfonine transaminase, ArgD
arginine N-succinyltransferase, AstA
succinylglutamic semialdehyde dehydrogenase, AstD
protein of unknown function
periplasmic sensor histidine kinase
two component transcriptional regulator, Winged helix family
periplasmic protein
catabolite gene activator, Crp
periplasmic protein with Set1-like repeats
2-prime-5-prime RNA ligase, LqT
signalling protein with GAF, PAS, GGDEF and EAL domains
TonB-dependent outer membrane Cu receptor, NosA
ATP-dependent helicase, HrpB
penicillin-binding protein 1B, McrB
peptidyl-prolyl cis-trans isomerase, PpiC_1
GCN5-related N-acetyltransferase
conserved hypothetical protein of unknown function DUF1778
collagenase
alcohol dehydrogenase, zinc-containing
prophage MuSo1 transcriptional regulator, Cro/CI family, C_1
prophage MuSo1 transposase, OrfA, TnpA, MuSo1a
prophage MuSo1 transposase, OrfB, TnpA, MuSo1b
prophage MuSo1 hypothetical protein
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prophage MuSo1 kil protein, KI_1
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prophage MuSo1 protein unknown function DUF1018, GemA_1
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IS504 transposase, TnpA, ISS504
prophage MuSo1 conserved hypothetical protein, E18_1
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transcriptional regulator, PadR family
hypothetical inner membrane protein
conserved hypothetical periplasmic protein
TonB-dependent nickel receptor, NicT
alkaline phosphatase
Dyp-type heme-dependent peroxidase, GgpB
gamma-glutamyltransferase, GgtT
ABC iron(III) transporter, periplasmic ligand-binding subunit, FbpA
ferredoxin-dependent glutamate synthase, GlsF
phosphoglycerate mutase family protein
ferredoxin--NADP reductase, Fpr
NAD dependent epimerase/dehydratase family protein
transcriptional regulator, LysR family
isochorismate hydrolase family protein
nitrogen regulatory protein P-II, GlnK
transcriptional regulator, AraC family
putative periplasmic protein
TPR domain lipoprotein
phospho-2-dehydro-3-deoxyheptonate aldolase, phe-sensitive, AroG
conserved hypothetical protein
ABC iron(III) transporter, ATPase subunits
ferredoxin-dependent peroxidase
alkaline phosphatase
TonB-dependent receptor, ATPase subunit, FtsPs
ABC iron(III) transporter, inner membrane subunit, FgpB
conserved hypothetical protein
glutathione-S-transferase family protein
conserved hypothetical protein
ABC iron(III) transporter, inner membrane and ATPase subunits
hypothetical periplasmic protein
TPR domain lipoprotein
ammonium transporter, AmtB
NAD dependent epimerase/dehydratase family protein
arginine biosynthetic gene repressor, ArgR
NAD dependent malate dehydrogenase, Mdh
thiol-disulfide oxidoreductase, DCC family
dihydrofolate reductase, FolM
IIS5dfD transposase, TnpA, ISSodB
5-formyltetrahydrofolate cyclo-igase, YgfA
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FAD-dependent hydroxylase, VvGC
aminomethyltransferase, GcvT
glycine cleavage system H protein, GcvH
hypothetical protein
superfamily I DNA and RNA helicase
Nerd domain protein
hypothetical protein
conserved hypothetical protein
short-chain dehydrogenase/reductase family protein
transcriptional regulator, LysR family
conserved hypothetical protein
conserved hypothetical inner membrane protein
conserved protein of unknown function, TIGR03549
diguanosine cyclase
duolipin
periplasmic thioredoxin-family protein
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esterase/lipase/thioesterase domain protein
multidrug and toxin efflux protein, MATE family
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CBS domain protein
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RNA polymerase-binding protein, DksA

predicted phosphoribosyltransferase, RbsK

conserved protein of unknown function, FtsT

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ribokinase, RbsK

nucleoside/nucleotide utilization

pyrimidine-specific ribonucleoside hydrolase, RRA

nucleoside/nucleotide utilization

hypothetical protein

RCC1/BLIP-like superfamily lipoprotein

TonB-dependent vitamin B12 receptor, BtuB

expressed protein of unknown function

regulator for metE and meth, MetR

S-methylthioacylcoenzyme A reductase, MetE

TISod11 transposase, TnpA-TISod11

D-3-phosphoglycerate dehydrogenase, SerA

GCVT-like aminomethyltransferase

metal dependent phosphohydrolase with response regulator receiver modulation

Na(+)-linked D-alanine glycine transporter, AgcS

ABC transporter, ATPase subunit

prepilin peptidase processed protein

prepilin peptidase processed protein

nitrate reductase (NapA) twin-arginine signal chaperone, NapD

periplasmic nitrate reductase, ferredoxin component, NapG

hypothetical protein

translation elongation factor G, FusA

translation elongation factor G, FusA

hypothetical protein

periplasmic nitrate reductase, cytchrome c subunit, NapB

sulfite dehydrogenase subunit, NapH

periplasmic nitrate reductase, ferredoxin component, NapG

periplasmic nitrate reductase, molybdopterin-binding subunit, NapA

nitrate reductase (NapA) twin-arginine signal chaperone, NapD

type IV pilin-associated adhesin

preprotein peptidase processed protein

preprotein peptidase processed protein

preprotein peptidase processed protein

preprotein peptidase processed protein

protein of unknown function DUF2098

ABC transporter, inner membrane protein subunit

ABC transporter, ATPase subunit

Nar(+)-linked D-alanine glycine transporter, AgcS

hybrid multi-sensor histidine kinase with PAS sensory domains

metal dependent phosphohydrolase with response regulator receiver mediation

GCVT-like aminomethyltransferase

D-3-phosphoglycerate dehydrogenase, SerA

inner membrane protein of unknown function DUF2238

transcriptional regulator of curli operon, CsgD

major curli subunit, CsgA

minor curli subunit, CsgB

peptidase, subtilisin family

putative phosphoprotein of unknown function

pantoate--beta-alanine ligase, PanC

3-methyl-2-oxobutanoate hydroxymethyltransferase, PanB

2-amino-4-hydroxy-6-hydroxymethylpyridine-2-carboxamide phosphokinase, FoIK_1

polyA polymerase, PnB

glutamyl-tRNA-Asp synthetase, YadB

RNA polymerase-binding protein, DksA

rRNA (guanine-N(2))-methyltransferase, RsmC

periplasmic alkaline phosphatase, PhoA

glutathione synthetase, GshB

rRNA base methyltransferase, RsmE

putative periplasmic peptidase, C15 superfamily

class D carbapenem-hydrolyzing beta-lactamase, BlaA

transcriptional regulator, LysR family

acetyl-CoA carboxylase multifunctional enzyme, AccADCB

diguanulate cyclase

translation elongation factor G, FusA

transcriptional regulator, LysR family

hypothetical protein

periplasmic nitrate reductase, cytochrome c subunit, NapB

sulfite dehydrogenase subunit, NapH

periplasmic nitrate reductase, ferredoxin component, NapG

periplasmic nitrate reductase, molybdopterin-binding subunit, NapA

nitrate reductase (NapA) twin-arginine signal chaperone, NapD

type IV pilin-associated adhesin

preprotein peptidase processed protein

preprotein peptidase processed protein

preprotein peptidase processed protein

preprotein peptidase processed protein

protein of unknown function DUF2008

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ABC transporter, ATPase subunit

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minor curli subunit, CsgB

peptidase, subtilisin family

putative phosphoprotein of unknown function

pantoate--beta-alanine ligase, PanC

3-methyl-2-oxobutanoate hydroxymethyltransferase, PanB

2-amino-4-hydroxy-6-hydroxymethylpyridine-2-carboxamide phosphokinase, FoIK_1

polyA polymerase, PnB

glutamyl-tRNA-Asp synthetase, YadB

RNA polymerase-binding protein, DksA
sugar fermentation stimulation protein, SfsA
aminopeptidase, PepB
GCNS-related N-acetyltransferase
phosphoribosylkinase/uridine kinase family protein
protein of unknown function UPF0270
alpha/beta hydrolase family protein, YheT
conserved hypothetical periplasmic protein with TAT leader
oxidoreductase, GMC family
glutathione-dependent formaldehyde-activating enzyme, GlaA
protein of unknown function DUF2390
ABC transporter, ATPase subunit
conserved probable metal-binding protein of unknown function DUF2387
agmatine deiminase, AgmA
amiace family protein
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ISSod4 transposase, TnpA_ISSod4
pinH family protein
protein of unknown function UPF0167
glyoxalase family protein
oxido-reductase, aldo/keto reductase family
Na-translocating NADH-quinone reductase subunit A, NqrA
Na-translocating NADH-quinone reductase subunit B, NqrB
Na-translocating NADH-quinone reductase subunit C, NqrC
Na-translocating NADH-quinone reductase subunit D, NqrD
Na-translocating NADH-quinone reductase subunit E, NqrE
Na-translocating NADH-quinone reductase subunit F, NqrF
ankyrin domain protein
hypothetical protein
protein of unknown function DUF1568
chromosome partitioning protein, ParA family
hypothetical protein
cell filamentation protein, Fic
beta lactamase family protein
ankyrin domain protein
dioxygenase MarR family protein transcriptional regulator/GCNS-related N-acetyltransferase
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aryl-homoserine lactone acylase, AasD
serine transporter, SsdC
GCNS-related N-acetyltransferase
hypothetical protein
dicarboxylate:amino acid:cation symporter, DAACS family
lipoprotein of unknown function DUF306
hypothetical protein
signalling protein with GGDEF domain
conserved hypothetical protein
hypothetical protein
diguanylate cyclase
S-adenosylmethionine synthetase, MetIK
transketolase, Tkt
D-erythrose-4-phosphate dehydratase, Epd
phosphoglycerate kinase, Pfk
fructose-bisphosphate aldolase, class II, Calvin cycle subtype, Fba
outer membrane protein of unknown function DUF481
sodium proton antipporter, NhaD
transmembrane transcriptional regulator
hypothetical periplasmic protein
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split-soret diheme cytochrome c
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hypothetical transmembrane protein
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signalling protein with PAS and GGDEF domains
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autoinducer-2 production protein, LuxS
TonB-dependent receptor
NadD
rRNA large subunit methyltransferase H, RlmH
rod shape-determining protein, RodA
lytic murein transglycosylase B, MltB
rare lipoprotein A, RlpA
D-alanyl-D-alanine carboxypeptidase, DacA
lipoyl(octanoyl) transferase, LipB
lipoic acid synthetase, LipA
ribosomal-protein-alanine acetyltransferase, RimI
Fe-S assembly/repair lipoprotein, ApgE
protein of unknown function DUF539
bacterioferritin subunit 2, Bfr2
bacterioferritin subunit 1, Bfr1
methyl-accepting chemotaxis protein
DNA polymerase IV, DnaB
X-His dipeptidase, PepD
peptidase M17, leucyl aminopeptidase family
hypothetical protein
xanthine/uracil transporter, NCS2 family
glutamate 5-kinase, ProB
gamma-glutamyl phosphate reductase, ProA
hypothetical inner membrane protein
aminoacyl t-RNA deacetylase, YsaE
integral inner membrane protein of unknown function DUF6
chaperone protein, DnaK
chaperone protein, DnaJ
iSOd1 transposase, TnpA_iSOd1
conserved hypothetical protein
iSOd1 transposase, TnpA_iSOd1
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ATP-dependent RNA helicase, DEAD box family
M48 family peptidase lipoprotein
peptidyl-prolyl cis-trans isomerase, FkB_4
dihydricarboxilate reductase, DapB
carboxamidophosphate synthase, small subunit, CarA
carboxamidophosphate synthase, large subunit, CarB
periplasmic solute binding protein
methyl-accepting chemotaxis protein
magnesium transporter, MgtE_4
hypothetical secreted protein
Endonuclease/exonuclease/phosphatase family protein
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ribosome S-phosphate isomerase, RipA
membrane protein of unknown function DUF808
exonuclease
hypothetical protein
hypothetical periplasmic protein
TonB-dependent siderophore receptor
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lipoyl-glycerol kinase, LipF
lipoyl(octanoyl) transferase, LipB
protein lipoylation system protein, YbeD
D-alanyl-D-alanine carbamoyltransferase, DacA
rare lipoprotein A, RlpA
lytic murein transglycosylase B, Mmb
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penicillin-binding protein 2, MraA
rRNA large subunit methyltransferase H, RimH
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nicotinate-nucleotide adenyllytransferase, NadD
DNA polymerase III, delta subunit, HolA
OM lipoprotein component of lipopolysaccharide assembly complex, LptE
leucyl-tRNA synthetase, LeuS
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preplin peptidase processed protein
apolioprotein N-acetyltransferase, Lnt
magnesium and cobalt efflux protein, CorC
metal-dependent hydrolase, YbeY
PhoH family protein
c-di-GMP-binding protein
expressed protein of unknown function DUF1451
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2-octaprenyl-3-methyl-6-methoxy-1,4-benzoquinone hydroxylase, UbiF
peptidyl-tRNA hydrolase, Pth
GTP-binding protein, YchF
hypothetical protein
inner membrane protein with PapSV TM helix
putative perplasmin protein of unknown function DUF2271
putative periplasmin CbiK superfamily protein
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protein-export membrane protein, SecD_2
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peptidase M41 family, FtsH
1,2-dihydroxyacetone synthase, FoIP
phosphoglucoamine mutase, GlimM
triose phosphate isomerase, TpiA
preprotein translocase subunit, SecG
expressed protein of unknown function DUF150
N utilization substance protein A, NusA
translation initiation factor IF-2, IniB
ribosome-binding factor A, RibF
rRNA pseudouridine synthase B, TruB
ribosomal protein S15, RpsO
functional deoxyguanylate cyclase with HAMP domain/signalling protein with EAL domain
polyribonucleotide nuclease/diesterase, PnpA
globular tetratricopeptide repeat containing lipoprotein, NlpJ
peptide chain release factor 3, PheA
hydrodase, TatD family
N+ dependent nucleoside transporter, NucC family
outer membrane protein, OmpK
deoxyribose-phosphate aldolase, DecC
thymidine phosphorylase, DeoA
phosphoenolpyruvate carboxylase, PEP
purine nucleoside phosphorylase, Npu
SMP-2 superfamily membrane protein
phosphosynthetase phosphatase, SerB
esterase/ lipase/cholesterolase family protein
c-di-GMP-binding protein
DNA repair protein, RadA
c-di-GMP-binding protein
two component transcriptional regulator for trimethylamine oxide utilization, TorR
periplasmic component of the TorRS TMQO sensory system, TorD
hybrid sensor histidine kinase for trimethylamine-N-oxide utilization, TorS
Tor-specific chaperone, TorD
trimethylamine-N-oxide reductase, TorA
trimethylamine-N-oxide reductase, membrane anchored cytochrome c component, TorC	small transmembrane component of the trimethylamine N-oxide reductase system, TorE
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metallophosphoesterase
conserved hypothetical protein
Band 7 family protein
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family M32 unassigned peptidases
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expressed protein of unknown function
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inner membrane component of lipopolysaccharide transporter, LptG
multifunctional chorismate mutase P/prephenate dehydratase/DAHP synthetase, PheA
NADPH-dependent glutamate synthase, small subunit
NADPH-dependent glutamate synthase, large subunit, GldB
radical SAM superfamily protein
histidine-containing phosphotransfer domain protein, HptA
transcriptional regulator, LysR family
adenylate cyclase, CyaC
DNA mismatch repair endonuclease, MutH
tRNA (guanine-N1)-methyltransferase, TrmD
ribosomal protein S16, RpsP
cytochrome c assembly protein
integral membrane protein with CBS and transporter associated domains
holo-(acyl-carrier protein) synthase, AcpS
dNA repair protein, RecO
ribosomal protein biosynthetic proteins, PdsJ
holo-(acyl-carrier protein) synthase, AcpS
inner membrane protein of unknown function DUF392
integral membrane protein with CBS and transporter associated domains
cytochrome c assembly protein
signal recognition particle protein, Ffh
ribosomal protein S16, RpsP
16S-RNA processing protein, RlmM
rRNA (guanine-N1)-methyltransferase, TrmD
ribosomal protein L19, RplQ
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d bifunctional chorismate mutase T/prephenate dehydrogenase, TyrA
3-deoxylamine reductase, Hpr
NADH oxidoreductase, Hcr
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sodium proton antiporter, CPA1 family
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inner membrane component of lipopolysaccharide transporter, LptG
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ATP-dependent RNA helicase, DEAD box family
methyl-accepting chemotaxis protein with PAS/PAC sensory domain
HD domain protein
aminopeptidase P, AmpP
ROK family protein
peptidyl-prolyl cis-trans isomerase, PklB_5
short chain fatty acids transporter family
conserved hypothetical inner membrane protein
transcriptional regulator, TetR family
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stator-force generator of Na+ coupled flagellar motor, PomA
stator-force generator of Na+ coupled flagellar motor, PomB
sulfurtransferase, ThiI
hypothetical periplasmic protein
glycine cleavage system transcriptional activator, GcvA
alpha/beta-hydrolase superfamily protein
conserved hypothetical inner membrane protein
2-oxo-ribose methyltransferase, RimM
isocitrate dehydrogenase, NAD-dependent
periplasmic peptidase, family 9B
expression of the omega-3 polyunsaturated fatty acid (PUFA) synthase subunit, PfaA
omega-3 polyunsaturated fatty acid synthase, PfaB
multi-domain beta-ketoacyl synthase, PfaC
omega-3 polyunsaturated fatty acid synthase subunit, PfaD
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hypothetical protein
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hypothetical inner membrane protein
succinylglutamate desuccinylase/aspartoacylase family protein
PhnA domain protein
hypothetical protein
transcriptional regulator, MarR family
sucroryglutamate desucroryglutamate family protein
fumaroylacetocacetate hydrolase family protein
cyclic nucleotide-binding domain protein
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omegA-3 polyunsaturated fatty acid synthase subunit, PfaD
double-domain beta-ketoacyl synthase, PfaC
omega-3 polyunsaturated fatty acid synthase, PfaB
omega-3 polyunsaturated fatty acid synthase subunit, PfaA
transcriptional regulator for synthesis of eicosapentaenoic acid, PfaR
4-prime-phosphopantetheinyl transferase, PfaE
lipoprotein
alkyl sulfatase
transcriptional regulator, LyrR family
NADPH-dependent preQ0 reductase, QueF
SecY binding protein, Syd
Methylmalonate-semialdehyde dehydrogenase, MmsA
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protein of unknown function DFU446
RNA pseudouridylate synthase family protein, TruC
hypothetical protein
flavodoxin family protein
PTS system glucose-specific IIBC component, PtsG
formyltetrahydrofolate dehydrogenase, PufU
2,3,4,5-tetrahydropyrimidine-2,4-carboxylate N-succinyltransferase, DapD
protein-P-II uridylyltransferase, GinD
methionine aminopeptidase, subfamily 1, Map
ribosomal protein S2, RpS2
translation elongation factor EF-Ts, Tsf
uridylate kinase, PyrH
ribosome recycling factor, Frr
undecaprenyl-diphosphate synthase, UppS
phosphatidate cytidylyltransferase, CdaA
1-deoxy-D-xylulose 5-phosphate reductoisomerase, Dxr
intramembrane zinc metalloprotease, RseP
beta barrel protein translocation component, BamA
periplasmic chaperone for outer membrane proteins, Skp
UDP-3-O-(3-hydroxymyristoyl) glucosamine N-acetyltransferase, LpxD
(3R)-hydroxymyristoyl-(acyl-carrier-protein) dehydratase, FabZ
acyl-(acyl-carrier-protein)-UDP-N-acetylglucosamine O-acetyltransferase, LpxA
lipid A disaccharide synthase, LpxB
ribonuclease HHI, RnH1
DNA polymerase III, alpha subunit, DnaE
rRNA(16S) 5S ribosomal RNA synthase, TiS
pyrimidylate cyclase
thiamine thiolation K(+)-efflux system, KefB
cold shock protein, CspG
protein of unknown function DFU885
helicase/SNF2 family domain protein
PHP (Polymerase and Histidinol Phosphatase) domain protein
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3-phospho-2-deoxy-3-deoxy-d-xylo-hexodialdose synthase, CysO_2
D-hexose 6-phosphotransferase, HexA
inner membrane protein of unknown function DFU218
conserved hypothetical inner membrane protein
surface localized decahexamethylene cytochrome c lipoprotein
transcriptional regulator, LysR family
protein of unknown function DFU583
nitrate reductase (NapA) maturase, NapF
UDP-glucose 4-epimerase, GaeE
UGTP-glucose-1-phosphate uridylyltransferase, GaU
phenylalanine-4-hydroxylase, PHA
peptidyl-4-alpha-carbinolamine dehydratase, PhbB
aromatic amino acid biosynthesis/transcript transcriptional repressor, TyrR
fumarylacetoacetate hydrolase, FaaH
maleylacetoacetate isomerase, Maa
protein of unknown function DFU925
outer membrane protein, OmpW
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3-ketoacyl-CoA thiolase, AcCoT
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<td>W3181_2652</td>
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<tr>
<td>polypeptide biosynthetic pathway thiolesterase, OlnA</td>
<td>SO_1729</td>
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<td>polypeptide biosynthetic pathway dehydrogenase/isomerase, OlnD</td>
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<td>conserved hypothetical inner membrane anchored protein</td>
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<td>TeR family integral membrane protein</td>
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<td>monooxygenase cytochrome c</td>
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<tr>
<td>ABC transporter, ATPase subunit</td>
<td>SO_1736</td>
<td>MR4_2539</td>
<td>MRT_2605</td>
<td>W3181_2644</td>
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<td>intramembrane peptidase, M1 family</td>
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<td>MR4_2538</td>
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<td>conserved hypothetical protein</td>
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<td>MRT_2603</td>
<td>W3181_2642</td>
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<td>phosphoglucomutase/phosphomannomutase family protein</td>
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<td>MR4_2536</td>
<td>MRT_2602</td>
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MotA/TolQ/ExbB proton channel family protein
 TonB system biopolymer transport component
 DNA transport ComEA-like competence protein
 methionine gamma-lyase, MdeA
 inner membrane protein of unknown function DUF697, YcjF
 psp operon transcriptional activator, PspF
 ABC peptide transporter, inner membrane subunit, SapB
 ABC peptide transporter, inner membrane subunit, SapC
 ABC peptide transporter, ATPase subunit, SapD
 outer membrane protein, MtrB
 periplasmic decaheme cytochrome c, MtrA
 surface localized decaheme cytochrome c lipoprotein, MtrC
 surface localized decaheme cytochrome c lipoprotein, MtrF
 transporter systems, TnpA, ISSod4
 glutamate decarboxylase
 l-glutamate transporter, GntP
 catalase-related protein
 uracil-DNA glycosylase superfamily protein
 outer membrane protein, MtrB
 periplasmic decaheme cytochrome c, MrcD
 ferrous iron transport protein A, FeoA
 periplasmic iron transport protein B, FeoB
 glutaminyl-tRNA synthetase, GlnS
 expressed inner membrane protein of unknown function DUF1282
 UDP-2,3-diacylglycerol hydrolase, LpxH
 cysteinyl-tRNA synthetase, cystS
 bifunctional methylenetetrahydrololate dehydrogenase (NADP+)-methylenetetrahydrololate cyclohydrolase, FdO
 ATP-dependent Clp protease, proteolytic subunit, ClpP
 ATP-dependent Clp protease, ATP-binding subunit, ClpX
 ATP-dependent protease Lc, Lon
 histidine-like DNA-binding protein, HupB
 peptidyl-prolyl cis-trans isomerase, PpiD
 molybdenum-pterin binding protein, MsoP
 enoyl acyl carrier protein reductase, FabV
 ABC peptide transporter, ATPase subunit, SapD
 ABC peptide transporter, inner membrane subunit, SapC
 ABC peptide transporter, inner membrane subunit, SapB
 psb operon transcriptional activator, PsbF
 phage shock protein A, PsPα
 phage shock protein B, PsPβ
 phage shock protein C, PsPγ
 protein of unknown function DUF463, YcjX
 inner membrane protein of unknown function DUF697, YcfF
 methionine gamma-lyase, MdeA
 DNA transport ComEA-like competence protein
 late competence development protein, ComFB
 histone deacetylase superfamily protein
 periplasmic protein of unknown function DUF2057
 primosomal replication protein N-prime-like protein
 inner membrane protein of unknown function DUF81
 ATP-dependent helicase, DnG
 DNA polymerase II, PoB
 porin
 TonB-dependent receptor
 predicted pectin utilization
 TonB system biopolymer transport component
 MotA/TolQ/ExbB proton channel family protein
TonB-mediated energy transduction system, inner membrane component; ExbD_1
TonB-mediated energy transduction system, inner membrane component; ExbD_1
energy transducer for outer membrane transport, TonB
TPR domain protein
signalling protein with GGDEF domain
putative outer membrane lipoprotein of unknown function DUF885
peptidyl-prolyl cis-trans isomerase, PspC_2
ISSod7 transposase, TnpA, ISSod7
ribosomal protein S5 p-alanine acetyltransferase, RimJ
S4 RNA-binding domain protein
protein of unknown function DUF1260
hypothetical inner membrane protein
expressed secreted protein of unknown function
conserved hypothetical inner membrane protein
hypothetical inner membrane protein
conserved hypothetical protein
outer membrane endonuclease/exonuclease/phosphatase
conserved hypothetical protein
expressed protein of unknown function
expressed protein of unknown function
expressed aspartic acid-rich protein
DnaJ domain protein
23S rRNA (guanine-N(2)-) methyltransferase, RmlL
thioredoxinylglutaredoxin 2 family protein
ABC transporter ATPase-like protein
secreted protein
ribosome modulation factor, Rmf
3-hydroxyoctanoyl-(acyl-carrier-protein) dehydratase, FabA
peptidase, S16 family
two component transcriptional regulator, UvrY
exonuclease ABC, C subunit, UvrC
CDP-diacylglycerol-glycerol-3-phosphate 3-phosphatidyltransferase, PgsA
histone-like DNA-binding protein
hypothetical protein
ABC transporter, ATPase subunit
hypothetical inner membrane protein
expressed protein of unknown function DUF480
nucleic acid binding superfamily protein, Yitl type
hypothetical protein
biosynthetic arginine decarboxylase, SpeA
S-adenosylmethionine decarboxylase, SpeD
surface lipoprotein with VGSB repeats
short-chain dehydrogenases/reductases family protein
ISSod4 transposase, TnpA, ISSod4
transcriptional regulator, lsrR family
thioredoxin-dependent thiol peroxidase, Bcp
glycine cleavage system transcriptional repressor, GcvR
dihydricolinate synthase, DapA
beta barrel protein translocation component, BamD
type I secretion system, membrane fusion protein, RND family
type I secretion system, inner membrane component, RND superfamily
GCN5-related N-acetyltransferase
integrin cytoplasmic membrane protein
expressed protein of unknown function
expressed ThiU/Pipl family protein
conserved hypothetical protein
protein of unknown function DUF1568
proteinc of unknown function DUF1568
acetyl-CoA/citrate-CoA transferase, alpha subunit, AtoA
acetyl-CoA/citrate-CoA transferase, beta subunit, AtoD
3-hydroxymethylglutaryl-CoA lyase, Lue
methylcrotonyl-CoA carboxylase, biotin-containing subunit, LiuD
methylcrotonyl-CoA carboxylase, carboxyl transferase subunit, LiuB
isovaleryl-CoA dehydrogenase, LiuA
branched chain amino acid metabolism regulator, LiuR
expressed periplasmic protein with peptidoglycan binding domain
propionyl-CoA synthetase, PrpE
small multiding resistance protein, SugE
6-phosphogluconate dehydrogenase, decarboxylating, Gnd
conserved hypothetical protein
ISSod1 transposase, TnpA_ISSod1
ISSod2 transposase, TnA_ISSod2
1,4-dihydroxy-2-naphthoate octaprenyltransferase, MenA
catalytic subunit of aromatic ring-opening dioxygenase
2-oxoglutarate dehydrogenase, E1 component, SucA
4-hydroxyphenylpyruvate dioxygenase, HppD
cyclic di-GMP hydrolase
GCN5-related N-acetyltransferase
conserved hypothetical protein
ISG19 transposase, TinA_ISSod1
galectin
transcriptional regulator, LysR family
hypothetical protein
catalytic subunit of aromatic ring-opening dioxygenase
1,4-dihydroxy-2-naphthoate octaprenyltransferase, MenA
oxidoreductase, short chain dehydrogenase/reductase family
acetyl-CoA dioxygenase II, TesB
conserved lipoprotein of unknown function
acyl-CoA thioesterase II, TesB
1,4-dihydroxy-2-naphthoate octaprenyltransferase, MenA
catalytic subunit of aromatic ring-opening dioxygenase
two component transcriptional regulator, PhoP
2OG-Fe(II) oxygenase family protein
cyclic di-GMP hydrolase
conserved hypothetical protein
decarboxylase of acetyl-CoA synthetase, NAD-dependent, CobB
GCN5-related N-acetyltransferase
two component transcriptional regulator, PhoP
conserved hypothetical protein
proton:glutamate symporter, DAACS family
invasin domain protein
SISod11 transposase, TinA_ISSod1
SISod23 transposase, TnA_ISSod23
gamma-glutamyltransferase, GgtA
homogentisate export protein
hypothetical protein
periplasmic YbBb/YbCl family protein
conserved hypothetical periplasmic protein
glyoxylase-like domain protein
solute binding protein
conserved hypothetical protein
maltose O-acetyltransferase, Maa
transcriptional regulator, LysR family
expressed periplasmic protein with peptidoglycan binding domain
conserved hypothetical protein of unknown function
ISF482
homogentisate export protein
expressed protein of unknown function DUF124
conserved hypothetical inner membrane protein
protein of unknown function DUF589 SO_1981 MR4.2287 MR7.2359 W3181.1683
conserved hypothetical protein MR4.2278 MR7.2350 W3181.1683
ISSod3 transposase, TnpA_ISSod3 SO_1981 MR4.2287 MR7.2350 W3181.1683
deryloxyethylcarboxypeptidase SO_1981 MR4.2278 MR7.2350 W3181.1683
conserved hypothetical protein MR4.2278 MR7.2350 W3181.1683
conserved hypothetical protein MR4.2278 MR7.2350 W3181.1683
toxic phosphatase pyrophosphokinase, Prs SO_1981 MR4.2287 MR7.2359 W3181.1683
nicotinamide phosphoribosyltransferase SO_1981 MR4.2287 MR7.2359 W3181.1683
dNA polymerase III, gamma and tau subunits, DnaX SO_1981 MR4.2287 MR7.2359 W3181.1683
DNA polymerase Ili, with DsoA and tau subunits, DnaX SO_1981 MR4.2287 MR7.2359 W3181.1683
adenylate kinase, Adk SO_1981 MR4.2287 MR7.2359 W3181.1683
ferrochelatase, HmuH_1 SO_1981 MR4.2287 MR7.2359 W3181.1683
NH(3)-dependent NAD(+) synthetase, NadE SO_1981 MR4.2287 MR7.2359 W3181.1683
ISSod1 transposase, TnpA_ISSod1 SO_1981 MR4.2287 MR7.2359 W3181.1683
ISSod1 transposase, TnpA_ISSod1 SO_1981 MR4.2287 MR7.2359 W3181.1683
expressed protein of unknown function SO_1981 MR4.2287 MR7.2359 W3181.1683
integron integrase, Inr SO_1981 MR4.2287 MR7.2359 W3181.1683
signalling protein with EAL domain SO_1981 MR4.2287 MR7.2359 W3181.1683
soluble lytic murein transglycosylase, Smry SO_1981 MR4.2287 MR7.2359 W3181.1683

*Partially conserved domains were not included in the list.*
methyl-accepting chemotaxis protein
anti-sigma factor antagonist
protein phosphatase with response regulator receiver modulation
chemotaxis response regulator, CheY_1
two component chemotaxis signal transducing histidine kinase, CheA_1
chemotaxis adaptor protein, CheW_1
methyl-accepting chemotaxis protein with 2 PAS sensory domains
chemotaxis MCP methyltransferase, CheR_1
chemoreceptor glutamine deamidase, CheD_1
disuclide cyclase with response regulator receiver modulation
expressed protein of unknown function
ISSod11 transposase, TnpA_ISSod11
ISSod16 transposase, TnpA_ISSod16
amino acid antiporter protein, AAE Family
NO-binding sensor protein
histidine kinase
hypothetical protein
exodeoxyribonuclease V, alpha subunit, RecD
exodeoxyribonuclease V, beta subunit, RecB
exodeoxyribonuclease V, gamma subunit, RecC
transglutaminase family protein
protein of unknown function
AAA+ ATPase, MoxR MRP family
glyoxalase family protein
doxygen hydrogenase, family 13
glyoxyl hydratase, alpha-amylose family
ISSod22 transposase, TnpA_ISSod22
putative maltose-specific TonB-dependent receptor
ISSod25 integrase
ISSod25 transposase, TnpA_ISSod25
FRG domain protein
ISSod1 transposase, TnpA_ISSod1
ISSod1 transposase, TnpA_ISSod1
digluanylate cyclase with PAS sensory domain
putative phosphoglycerol transferase, YejM
protein of unknown function
nucleoid-associated protein, NdpA
diheme cytochrome c5 peroxidase, CcpA
expressed protein of unknown function
subfamily M23B unassigned peptidases
conserved hypothetical protein
expressed protein of unknown function
periplasmic EriH/YbiSt/YcdS/YnhK family protein
exopolysphatase, Ppx
ISSod11 transposase, TnpA_ISSod11
polyphosphate kinase, PpkA
hsp70 family protein
lipoprotein, CreA
cystathionine beta-lase, MetC
periplasmic sensor histidine kinase
two component transcriptional regulator, Winged helix family
MotB family protein
inter-alpha-trypsin inhibitor family protein
sortase, Sna
diguanylate cyclase
peptidase, M2G family
porin protein
ribosomal protein S6 modification protein
expressed protein of unknown function
transcriptional regulator, LysR family
diazoacylpeptidyl kinase, DgA
DNA ligase, ATP-dependent
conserved hypothetical inner membrane protein
low molecular weight phosphotyrosine protein phosphatase, PtpA
ISSod4 transposase, TnpA_ISSod4

ISSod25 integrase
ISSod25 transposase, TnpA_ISSod25
alpha-glucosidase, AlgA
glucose permease, GlpU
rRNA SAM-dependent methyltransferase family protein
bifunctional diguanylate cyclase with GAF and PAS sensory domains/signaling protein with EAL domain
D-alanine–D-alanine ligase, DdA
asparaginyl-ribozyme synthetase, AsnRS
conserved hypothetical inner membrane protein
nucleoside diphosphate hydrolase, YeaB
para-aminobenzoate synthase, subunit I, PabB
anaerobic fumarate hydratase, FumB
subfamily 9C unassigned peptidases
GCN5-related N-acetyltransferase
carboxypeptidase-like protein
ISSod3 transposase, TnpA_ISSod3
CBS domain protein
ATP-dependent helicase, HrpA
ISSod271 transposase
ATP-binding of ABC transporter protein
hypothetical protein
PTS system, glucose-specific IIA component, Ccr
PTS system phosphoenolpyruvate-protein phosphotransferase, PtsI
phosphocarrier protein HPr, PtsH
conserved hypothetical protein
methyl-accepting chemotaxis protein
expressed protein of unknown function
maltosaccharide utilization regulator, MalR
exonuclease, DnaQ-like
putative lipoprotein
L-serine ammonia-lyase, SdaA
beta-hexosaminidase, NagZ
expressed protein of unknown function UPF0227
acylphosphate, AcyP
conserved hypothetical periplasmic protein
transcription-repair coupling factor, Mfd
conserved protein of unknown function
ABCI isoprotein exporter, transmembrane subunit, LoLE
ABCI isoprotein exporter, ATPase subunit, LoLID
ABCI isoprotein exporter, inner membrane subunit, LoLEC
inositol-phosphate phosphatase, SubB
rRNA-Cim22/Um52 methyltransferase, TrmJ
seryl acetyltransferase, Cyse
transcriptional repressor of iron-sulfur cluster assembly genes, IscR
cytosine deaminase, IscS
FeS cluster assembly scaffold protein, IscU
FeS cluster assembly protein, IscA
co-chaperone Hsc20, HscB
chaperone protein, HscA
2Fe-2S ferredoxin, Fdx
ribosomal protein S6 modification protein, RimK_2
protein of unknown function DUF528
ISSod4 transposase, TnpA_ISSod4
hypothesised protein
nucleoside diphosphate kinase, NdK
ISSod10 transposase, TnpA_ISSod10
16 KDa heat shock protein A, htpA
acetylactate synthase III, small subunit, livH
acetylactate synthase III, large subunit, livI
multidrug efflux protein, MFS superfamily
conserved hypothetical protein
transcriptional regulator, GntR family
ISSod3 transposase, TnpA_ISSod3
ISSod11 transposase, TnpAISSod11
amino acid efflux protein, RhtB family
sulfate transporter, SulP family
glutathione-S-transferase domain protein
rhodanese domain protein
hypothetical protein
ISSod4 transposase, TnpA_ISSod4
multidrug and toxic efflux protein, MATE family
6-H-l-ribityllumazine synthase, alpha subunit, RibC
conserved hypothetical protein
hypothetical protein
three-base RNA synthetase, ThrS
translation initiation factor IF-3, InfC
ribosomal protein L35, Rpml
ribosomal protein L20, Rp20
thioredoxin reductase, TrxB
alanine dehydrogenase, AlaD
leucine-responsive regulatory protein, Lrp
cell division protein, FtsK
outer membrane lipoprotein carrier protein, LoxA
AAA ATPase domain protein
inner membrane protein, CrcB
seryl-tRNA synthetase, SerB
hypothetical protein
serine protease inhibitor, ecotin, EcocT
ISSod1 transposase, TnpA_ISSod1
ISSod4 transposase, TnpA_ISSod4
methyl-accepting chemotaxis protein
chemotaxis response regulator, CheY_2
anti-sigma factor
two component chemotaxis signal transducing histidine kinase, CheA_2
ISSod4 transposase, TnpA_ISSod4
methyl-accepting chemotaxis protein
chemotaxis adaptor protein, CheW_2
chemotaxis MGP methyltransferase, CheR_2
chimeroreceptor glutamine deaminase, CheD_2
chemotaxis protein-glutamate methyltransferase, CheB_2
translation elongation factor P, Efp
conserved hypothetical protein
flavodoxin, FdxA
ribon-helix-helix protein repressor, CopG family
conserved hypothetical protein
hydrolase, alpha/beta fold family
negative regulator of DNA replication, SeqA
phosphoglucomutase, alpha-D-glucose phosphate-specific, Pgm
peptide methionine sulfoxide reductase, MsrA
sucroxyglutamate desuccinylase, AceE
3-methyl-2-oxobutanoate dehydrogenase complex, E1 component, alpha subunit, BkdA1
3-methyl-2-oxobutanoate dehydrogenase complex, E1 component, beta subunit, BkdA2
3-methyl-2-oxobutanoate dehydrogenase complex, E2 component, BkdB
quinolinate synthetase, NadA
ISSod4 transposase, TnpA_ISSod4
glyceraldehyde-3-phosphate dehydrogenase (NAD+), GapA_2
conserved lipoprotein
SO_2273 MR_1746.1 MR_1782.1 W3181_1869 Sama_1300
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SO_2275
SO_2277 MR_1748 MR_1828 W3181_1871 Sama_2020
SO_2278 MR_1749 MR_1829 W3181_1872 Sama_2019
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SO_2282 MR_1753 MR_1833 W3181_1877 Sama_2016
SO_2283
SO_2284 MR_1754 MR_1834 W3181_1878 Sama_2015
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SO_2286 MR_1756 MR_1836 Sama_2013
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SO_2335 MR_1807 MR_1885 W3181_1928 Sama_1808
SO_2336 MR_1808 MR_1886 W3181_1929 Sama_1809
glyceroldehyde-3-phosphate dehydrogenase, GapB
aspartate aminotransferase, AspC_1
protein of unknown function UPF0052
glycoside hydrolase, family 73
conserved periplasmic protein
irRNA(Cytosine32)-2-thiocytidine synthetase, YdaO
universal stress protein, UspE
oxygen sensitive electron transport regulator A, EtrA
conserved hypothetical inner membrane protein
Cbb3-type cytochrome oxidase assembly protein, CcoG
Cbb3-type cytochrome oxidase, copper translocating P-ATPase, Cool
Cbb3-type cytochrome oxidase assembly protein, CcoH
Cbb3-type cytochrome c oxidase, subunit III, CcoP
Cbb3-type cytochrome c oxidase, subunit II, CcoO
Cbb3-type cytochrome c oxidase, subunit I, CcoN
conserved hypothetical protein
metal-dependent phosphohydrolase with response regulator receiver modulation
site-specific recombinase, phage integrase family
predicted glycyl radical enzyme, HI0521 type
aspartate aminotransferase, AspC_2
3-phosphoshikimate 1-carboxyvinyltransferase, AroA
cytidylate kinase, Cmk
site-specific recombinase, phage integrase family
hypothetical protein
multidrug efflux protein, EmrD
phosphoshikimate 1-carboxyvinyltransferase, AroA
hypothetical protein
D-aryl-D-alanine carboxypeptidase, DacB
acyl-CoA dehydrogenase
expressed protein of unknown function
2,4-dienoyl-CoA reductase
orotidine 5'-phosphate decarboxylase, PyrF
conserved hypothetical protein, YacM
protein of unknown function DUF1049
integration host factor, beta subunit, IfhB
ribosomal protein S1, RpsA
cytidine kinase, Cmk
3-phosphoshikimate 1-carboxyvinyltransferase, AroA
aspartate aminotransferase, AspC_2
predicted glycol radical enzyme, HID521 type
radical activating enzyme
transcriptional regulator, LysR family
bifunctional 3-phosphoserine aminotransferase/phosphohydroxythreonine, SerG
DNA gyrase subunit, GyrA
bifunctional 3-deoxy-D-arabinoheptulosonate 7-phosphate synthase, UbiG
HAD-superfamily hydrolase, subfamily 1A, variant 1
aerobic ribonucleoside-diphosphate reductase alpha subunit, NrdA
aerobic ribonucleoside-diphosphate reductase beta subunit, NrdB
metallothionein, cofactor maintenance protein, YfaE
predicted transposase, TnpA, IS588
protein of unknown function, UPF0052
NADP-dependent 2,4-dienoyl-CoA reductase, FadH
protease IV, SppA
expressed protein of unknown function
conserved lipoprotein of unknown function DUF885
ATP-dependent RNA helicase, DEAD box family
cytoplasmic peptidyl-prolyl cis-trans isomerase, PpiB
uncharacterised conserved protein UCP006173
conserved hypothetical protein
septum site-determining protein, MinC
membrane ATPase that activates MinC, MinD
division topological specificity factor, MinE
ribonuclease D, Rnd
internal membrane zinc metalloprotease
conserved hypothetical protein
peptidase M22, glycoprotease
delta-aminolevulinic acid dehydratase, HemB_1
methionine-R-sulfoxide reductase, SerR
oxidoreductase, iron/sulfur family
50S ribosomal subunit maturation GTPase, RbgA
protein of unknown function DUF1379
dihydroorotate dehydrogenase, PyrD
glutamate dehydrogenase (NAD+), Gdh
transport protein, RND superfamily
glycosyl hydrolase, BNR repeat protein
putative periplasmic protein of unknown function DUF1329
putative outer membrane protein of unknown function DUF1302
conserved hypothetical protein
alanyl aminopeptidase, PepN
periplasmic C-terminal processing protease, Prep
activator of ProP osmoregulatory transporter, ProQ
free methionine-R-sulfoxide reductase, YeBR
UV-induced GC-rich region protein, YeBG
Ppa family protein
PpaB family protein
peroxase, Gste superfamily
165-RNA m5C1407 methyltransferase, RsmF
Tat-related deoxyribonuclease, YcH
c-di-GMP-binding protein
DNA polymerase III, delta prime subunit, HollB
thymidylate kinase, Tmk
conserved hypothetical protein
aminodeoxychorismate lyase, PabC
deoxyctidylate triphosphate deaminase, Dcd
uridine kinase, UrdK
Fe-S cluster repair protein, ApbC
methionyl-tRNA synthetase, MetG
transport protein, AEC family
expressed protein of unknown function DUF34, Ybgl
outer membrane protein, SylB-like
leucylphenylalanyl-RNA--protein transferase, Aat
arginine-RNA-protein transferase, Ate
translation initiation factor IF-1, 16kA
ATP-dependent Clp protease, ClpA and specificity subunit, ClpA
ATP-dependent Clp protease adapter protein, ClpS
DNA-binding cold shock protein, CspD
isocitrate dehydrogenase, NADP-dependent, Icd
RNA pseudouridylate synthase family protein
MutT/ndufx family protein
RNA (3-methyladenosinomethyl-2-thiouridylate)-methyltransferase, TrnU
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adenosinouclease lyase, PurB
expressed cupin family protein
expressed protein of unknown function
leucine dehydrogenase, Ldh
hypothetical protein
transcriptional regulator, MarR family
protein of unknown function DUF1285
oxidoreductase, FAD-binding
phosphoenolpyruvate synthase, PpsA
protein of unknown function DUF299, YdiA
phospho-2-dehydro-3-deoxyheptonate aldolase, trp-sensitive, AroH
cytosolic long-chain acyl-CoA thioester hydratase family protein
two component transcriptional regulator, LuxR family
transcriptional activator of cys regulon, CysB
conserved protein of unknown function
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prophage MuSo2 transcriptional regulator, Ner_2
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prophage MuSo2 transposase, OrfB, TrpA_MuSo2b
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prophage MuSo2 middle operon regulator, Mor_2
prophage MuSo2 expressed protein
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prophage MuSo2 small terminase subunit, D_2
prophage MuSo2 conserved hypothetical protein
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prophage MuSo2, conserved hypothetical protein, F
prophage MuSo2 hypothetic protein
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prophage MuSo2 protease, I_2
prophage MuSo2 major head subunit, T_2
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prophage MuSo2 tail tube protein, M_2
prophage MuSo2 conserved hypothetical protein, Gp41_2
prophage MuSo2 tail length tape measure protein, Gp42_2
prophage MuSo2 DNA circulation protein, N_2
prophage MuSo2 baseplate assembly protein, P_2
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prophage MuSo2 baseplate assembly protein, J_2
prophage MuSo2 phage morphogenesis protein, Gp48_2
prophage MuSo2 tail fiber protein, S_2
DNA topoisomerase I, TopA
DNA topoisomerase I, TopA
sarcosine dehydrogenase, AsxB
GCNS-related N-acetyltransferase
nitroreductase, YdgA
DcoD-like inner membrane protein
conserved lipoprotein
thiamine kinase
thiamin permease, PnuT
expressed protein of unknown function
TonB-dependent receptor
cAMP binding protein
nucleoside sugar transporter
purine nucleoside phosphorylase, DeeD
conserved lipoprotein of unknown function DUF1425
thioesterase superfamily protein
thioesterase superfamily protein
purine nucleoside phosphorylase, GinP
family M61 unassigned peptidases
transcriptional regulator, LysR family
TonB biopolymer transport system periplasmic component, TolB
peptidoglycan-associated lipoprotein, Pal
glutaredoxin, GrxA
acetyl-CoA synthetase, Acs
biotin synthase, BioB
8-amino-7-oxononanoate synthase, BioF
dipeptidase E, PepE
intramembrane peptidase, M48 family, HtpX
periplasmic tetrahydrobiopterin, CcaA
intranuclear peptidase, MA4 family, HtpX
dipeptidase E, PepE
periplasmic glucan biosynthesis protein, MdoG
ISSod6 transposase, TnpA_ISSod6
ISSod1 transposase, TnpA_ISSod1
conserved hypothetical protein
conserved hypothetical outer membrane protein
dethiobiotin synthase, BioD
bion synthetase protein, BioC
8-amino-7-oxonononoate synthase, BioF
bion synthetase, BioB
adenosylmethionine-8-amino-7-oxononanoate aminotransferase, BioA
hybrid proline transporter/sensor regulator, PHS
acetate utilization
helicase
glutaredoxin, GrxA
expressed secreted TPR repeat protein, YbgF
peptidoclycan-associated lipoprotein, Pal
TonB system biopolymer transport component, TonB
TonB system biopolymer transport component, ToLA
TonB system biopolymer transport component, ToLR
short chain acyl-CoA thiosterase, YbgC
prolyl endopeptidase
flagellar rotation associated protein, MotY
ribonuclease T, Rnt
peroxiredoxin, TsaA
transport protein, GntP family
signaling protein with GGDEF domain
uracil phosphoribosyltransferase, Upp
phosphoribosylformylglycinamidine cyclo-ligase, PurM
phosphoribosylformylglycinamidine formyltransferase, PurN
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ISSod5 transposase, TnpA_ISSod5
expressed conserved domain protein
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peptidase, M28 family
asparagine synthase, glutamine-hydrolyzing, AsnB
acyl-CoA dehydrogenase
aldolase 1-epimerase
2-hydroxy-3-octopropionate reductase, GarR
acyl-CoA thiosterase, Yga
hypothetical inner membrane protein
3-oxoacyl-(acyl-carrier-protein) synthase II , FabF_1
acyl carrier protein, AcpP
3-oxoacyl-(acyl-carrier-protein) reductase, FabG_1
malonyl CoA-acyl carrier protein transacylase, FabD
3-oxoacyl-(acyl-carrier-protein) synthase III, FabH
phosphate-acyl-ACP acyltransferase, PstX
ribosomal protein L32, RpmF
expressed protein of unknown function DUF17
Maf-like protein
HAD-superfamily hydrolase, subfamily C, RliC
ribonuclease E, Rne
HAD-superfamily hydrolase, subfamily nucleoside/nucleotide utilization
nucleoside/nucleotide utilization
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prophage LambdaSo lytic gene repressor, Cl
prophage LambdaSo expressed lipoprotein
prophage LambdaSo expressed protein of unknown function
prophage LambdaSo type II DNA modification methyltransferase
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prophage LambdaSo DNA methyltransferase
prophage LambdaSo conserved hypothetical protein
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prophage LambdaSo integrase, Int
segregation and condensation protein, ScpB
segregation and condensation protein, ScpA
RNA binding protein, YqG
NADH-dependent phosphatase, TrpH
anthranilate synthase component I, TrpE
anthranilate synthase component II, glutamine amidotransferase, TrpG
anthranilate phosphotransferase, TrpD
bifunctional indole-3-glycerophosphate synthetase/phosphoshandithiolate isomerase, TrpCF
tryptophan synthase, beta subunit, TrpB
tryptophan synthase, alpha subunit, TrpA
periplasmic esterase
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conserved hypothetical inner membrane protein
putrescine monooxygenase, PubA
N-hydroxyputrescine-succinyl CoA transferase, PubB
NTP-dependent putrebatcin synthetase, PubC
TonB-dependent ferric putrebatcin siderophore receptor, PubA
ferric putrebatcin reductase, PubB
intracellular septation protein, IspZ
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protein of unknown function DFU1568
protein of unknown function DFU1568
ISSod1 transposase, TnpA_ISSod1
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ISSod4 transposase, TnpA_ISSod4
hypothetical protein
methyl-accepting chemotaxis protein
conserved hypothetical inner membrane protein, DFU1097-like
isoquinoline 1-oxidoreductase, molybdopterin-binding subunit, lbrB
isoquinoline 1-oxidoreductase, FeS subunit, lbrA
molybdopterin guanyldtransferase, Moba
isoquinoline 1-oxidoreductase maturation factor
methyl-accepting chemotaxis protein
metallo-beta-lactamase family protein
proline iminopeptidase, Pp
flavocytochrome c, heme submit
phenylalanine/histidine ammonia-lyase family protein
flavocytochrome c, flavin subunit
sigma54 specific transcriptional regulator, Fis family
outer membrane porin
tRNA isoacceptor III, TopB
hypothetical inner membrane protein
cation alanine/glycine transporter, AGCS family
amiophosphoryl transferase, PurF
collcin V production protein, CypA
expressed protein with C-terminal peptidoglycan binding domain
bifunctional polyglycyltransfer synthase/hydrophosphate synthase, FoC
RNA pseudouridine synthase A, TruA
type IV plus assembly protein, FimV
aspartate semialdehyde dehydrogenase, Asd
type IV pilus assembly protein, FimV
tRNA pseudouridine synthase A, TruA
expressed protein with C-terminal peptidoglycan binding domain
50S subunit L3 protein glutamine methyltransferase, PrmB
chorismate synthase, AroC
transport protein, MFS superfamily
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erythronate-4-phosphate dehydrogenase, PdxB
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50S subunit L3 protein glutamine methyltransferase, PrmB
chorismate synthase, AroC
transport protein, MFS superfamily
3-oxoacyl-(acyl-carrier-protein) synthase I, FabB
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RNA methyltransferase, TrmH family
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ATP-NAD kinase
transport protein, MFS superfamily
chloroform synthase, SpoT
50S subunit L3 protein glutamine methyltransferase, PrmB
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phosphohistidine phosphatase, SiaA
peptidase, subfamily M16A
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anaerobic fatty oxidation complex, alpha subunit, FadJ
anaerobic fatty oxidation complex, beta subunit, FadJ
AAA+ ATPase, MspR MR-family
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expressed inner membrane anchored protein of unknown function
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TPR domain protein, BatB
expressed protein of unknown function, BatD
RNA polymerase sigma-70 factor, ECF subfamily
anti-Sigma factor
propionate symporter, PpuP
outer membrane long-chain fatty acid transport protein, FadL-family
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type I secretion system, membrane fusion protein, RND family
cation efflux protein, AcrB/AcrD/AcrF family
expressed inner membrane protein
periplasmic rhodanese domain protein
extracellular serine alkaline protease, SapSH
expressed protein of unknown function, YaeQ
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protein-export membrane protein, SecF_1
protein-export membrane protein, SecE2
preprotein translocase subunit, YajC
S-adenosylmethionine:RNA ribosyltransferase, Sma
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thioredoxin
ribosomal large subunit pseudouridine synthase, RluA_1
conserved hypothetical protein
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serine:N- asymporter, StsT  
chemotaxis protein, CheV_2  
dual specificity protein phosphatase  
ATP-dependent RNA helicase, DEAD box family  
constitutive O6-methyl-adenosine-DNA methyltransferase II, Ogt  
Ada-like regulatory protein  
ABC transporter, ATPase/inner membrane subunit  
glutaminyl-RNA synthetase, GiX  
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TRAP dicarboxylate transporter, periplasmic binding protein, DcIP  
TRAP dicarboxylate transporter component, DcIQ  
TRAP dicarboxylate transporter, DcIM  
C4-dicarboxylate transport sensor protein, DcIB  
two component SigmaA4 specific transcriptional regulator of C4-dicarboxylate transport, DcID  
penicillin-binding protein transpeptidase fold domain protein  
thymidine kinase, Tk  
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peptidyl-dipeptidase, Dcp_1  
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galactosyl transferase, WbfU  
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asparagine synthase, glutamine-hydrolyzing, WbpQ  
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polyasacharide deacetylase  
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glycosyltransferase, family 2, WbnI  
O-antigen flippase, Wzx  
O-antigen biosynthesis acetyltransferase, WbnH  
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enzyme for biosynthesis of dTDP-Qu4N  
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dTDP-glucose 4,6-dehydratase, RmlB  
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UDP-N-acetyl-D-galactosamine dehydrogenase, WbpO  
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predicted peptide utilization
outer membrane polysaccharide export protein, OtnA
transcriptional antiterminator, RfaH
proton-dependent oligopeptide transport family protein
phospholipid transport-associated protein, MAa
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flagellar hook protein, FlgE
flagellar component of cell-proximal portion of basal-body rod, FlgF
flagellar P-ring protein, FlgI
flagellar rod cap protein and peptidoglycan hydrolase, FlgJ
flagellar hook-filament junction protein, FlgK
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flagellin, FliC_1
flagellar filament capping protein, FliD
flagella biosynthesis chaperone for FliD, FliT
flagellar export protein, FliA
flagellar export protein, FliB
flagellar export protein, FliR
flagellar export protein, FliQ
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flagellar hook-flament junction protein, FjgK
flagellar rod cap protein and peptidoglycan hydrolase, FjgJ
flagellar P-ring protein, FjgP
flagellar L-ring protein, FjgH
flagellar component of cell-distal portion of basal-body rod, FjgG
flagellar component of cell-proximal portion of basal-body rod, FjgF
flagellar hook protein, FjgE
flagellar hook assembly protein, FjgD
flagellar basal-body rod protein, FjgC
flagellar basal-body rod protein, FjgB
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chemotaxis protein, CheY_3
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secretion chaperone for FlgK and FliG, FliN
putative lipoprotein of unknown function DUF400
putative lipoprotein
secreted protein of unknown function
expressed protein of unknown function DUF115
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threonine aldolase, YebJ
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small conductance mechanosensitive ion channel protein, MscS family
antioxidant, Ahp/CtsA family
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conserved lipoprotein of unknown function
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expressed protein of unknown function DUF469
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adenine glycosylase, MutY
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Ycl family protein
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hypothetical protein
deranged protein of unknown function
conserved lipoprotein
conserved hypothetical periplasmic protein
conserved hypothetical inner membrane protein
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conserved hypothetical protein of unknown function DUF1365
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transcriptional regulator-like protein
deoxyribosylpyrimidine photolase, Phr
transcriptional regulator, MerR family
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conserved hypothetical protein
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bifunctional signalling protein with PAS and GGDEF domains/diguanylate phosphodiesterase
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NADPH:flavin oxidoreductase, Sye4
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Sso044 transposase, TnpA, Sso045
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homoserine kinase, ThrB
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hypothetical inner membrane protein
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cytochrome b561
ribosomal associated cold shock response protein, YlaA
dNA polymerase III, chi subunit, HoC
valyl- tRNA synthetase, ValS
carbon storage regulator, CsrA
benzoquinone methyldihydroquinone reductase, Bqnr
Bacillus subtilis
transcription antitermination factor, NusB
phosphatidylglycerophosphatase A, PgpA
transcriptional regulator, LysR family
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hybrid periplasmic sensor histidine kinase, BarA
GTP pyrophosphokinase, RelA
expressed protein of unknown function
ISSod4 transposase, TnpA_ISSod4
hybrid periplasmic sensor histidine kinase, BarA
GTP pyrophosphokinase, RelA
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ISSod4 transposase, TnpA_ISSod4
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periplasmic pilin biogenesis protein
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iSSod3 transposase, TnpA_iSSod3
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periplasmic solute binding protein
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type I secretion system, membrane fusion protein, RND family
SO_3542

drug resistance transporter, Bcr/CflA subfamily
SO_3541

type IV pili-associated adhesin
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periplasmic pilin biogenesis protein
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type I secretion system, inner membrane component, RND superfamily
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beta-N-acetylhexosaminidase, HexA
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N-acetylglucosamine related transporter
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protein of unknown function DUF861
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ISSod3 transposase, TnpA_iSSod3
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protein of unknown function DUF861
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N-acetylgalactosamine related transporter, NagX
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glucosamine-6-phosphate deaminase, NagB
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N-acetylglucosamine kinase, NagK
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betagalacticosidase, BgaB
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putative methyl-accepting chemotaxis sensory transducer
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SacX family protein
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tryptophan halogenase, flavin-dependent
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TonB-dependent chitinoligosaccharide receptor
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transcriptional regulator
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ISSod4 transposase, TnpA_iSSod4
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nitrogen regulatory protein P-II, GlnB
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type IV minor pilin protein, FimT
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type IV pilus biogenesis protein, FimU
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type IV pilus regulatory protein P-I, GlnB
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type IV minor pilin protein, FimL
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1-hydroxy-2-methyl-2-(E)-butenyl 4-diphosphate reductase, IspH
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peptidyl-prolyl cis-trans isomerase, FkpB
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signal peptidase II, LspA
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isoerythryl-RNA synthetase, IesE
SO_3509

bifunctional flavokinase/FAD synthetase, RibF
SO_3508

peptidylglycan lipid II flippase, MurJ
SO_3507

ribosomal protein S20, RpsT
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transcriptional activator, HyaU
SO_3505

expressed protein of unknown function DUF328
cation:alamine/glucose transporter, AGCS family
SO_3504

D-xylose 5-phosphate/D-hexose 6-phosphate phosphoketolase, Xfp
SO_3503

iSSod13 transposase, TnpA_iSSod13
SO_3502

iSSod7 transposase, TnpA_iSSod7
SO_3501

outer membrane porin
SO_3500

transaldolase B, TaB
SO_3499

glucose-6-phosphate isomerase, Pgi
SO_3498

conserved hypothetical protein
SO_3497

expressed protein with dual HHE family cation binding domains
SO_3496

protein of unknown function DUF48
SO_3495

cyclod di-GMP hydrolase
SO_3494

BD multiglycoflux system, inner membrane subunit, MexF
SO_3493

transcriptional regulator, TetR family
SO_3492

OsmC-like superfamily protein
SO_3491

sucinate-semialdehyde dehydrogenase [NAD(P)+, GdBD
SO_3490

beta-alanine-pyruvate transaminase, AptA
SO_3489

aldolase
SO_3488

protein of unknown function DUF328
SO_3487

expressed protein with dual HHE family cation binding domains
SO_3486

protein of unknown function DUF48
SO_3485

transcriptional regulator, AraC/XylS family
SO_3484

outer membrane porin
SO_3483

drug resistance transporter, Bcr/CflA subfamily
SO_3482

drug resistance transporter, Bcr/CflA subfamily
SO_3481

periplasmic pilin biogenesis protein
SO_3480

ribosomal protein S20, RpsT
SO_3479

bifunctional flavokinase/FAD synthetase, RibF
SO_3478

peptidyl-prolyl cis-trans isomerase, FkpB
SO_3477

diguanylate cyclase
diguanylate cyclase
SO_3476

drug resistance transporter, Bcr/CflA subfamily
SO_3475

type IV minor pilin protein, FimT
SO_3474

type IV pilus regulatory protein P-I, GlnB
SO_3473

transcriptional activator, HyaU
SO_3472

expressed protein of unknown function DUF328
SO_3471

cation:alamine/glucose transporter, AGCS family
SO_3470

D-xylose 5-phosphate/D-hexose 6-phosphate phosphoketolase, Xfp
SO_3469

iSSod13 transposase, TnpA_iSSod13
SO_3468

expressed protein with dual HHE family cation binding domains
SO_3467

transcriptional regulator, AraC/XylS family
SO_3466

anti-Sigma factor
RNA polymerase sigma-70 factor, ECF subfamily
von Willebrand factor type A domain lipoprotein
sulfate transporter, SulP family
phosphoribosylaminomimidazole carboxylase, catalytic subunit, PurE
phosphoribosylaminomimidazole carboxylase, ATPase subunit, PurK
conserved hypothetical lipoprotein
hypothetical lipoprotein
glutamate–cysteine ligase, GshA
subfamily M16B unassigned peptidases
conserved hypothetical inner membrane protein
proton/sodium:glutamate symporter, DAACS family
SM-20 domain protein
peptidyl-dipeptidase Dcp_2
bifunctional 2-prime,3-prime-cyclic-nucleotide 2-prime-phosphodiesterase/3`-nucleotidase, CpdB
ISSod3 transposase, TnpA_ISSod3
ISSod4 transposase, TnpA_ISSod4
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expressed periplasmic protein of unknown function
stress-induced multi-chaaperone system component, CipB
expressed protein of unknown function DUF152
ribosomal large subunit pseudouridine synthase D, RuaD
beta barrel protein translocation component, BamC
methyl-accepting chemotaxis protein
ribosomal small subunit pseudouridine synthase, RuaA_1
winged-helix repressor protein
NADPH-dependent FMN reductase
glyoxalase family protein
conserved hypothetical protein
conserved inner membrane protein associated with acetate transport, YaaH
hypothetical periplasmic protein
outer membrane MipA family protein
hypothetical periplasmic protein
two component translocational regulator, RstA
periplasmic sensor histidine kinase, RstB
cysteine synthase B, CysM
ABC sulfate/thiosulfate transporter, periplasmic ligand-binding subunit, CysP
ABC sulfate/thiosulfate transporter, inner membrane subunit, CysT_1
ABC sulfate transporter, inner membrane subunit, CysW_1
ABC sulfate/thiosulfate transporter, ATPase subunit, CysA_1
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AAA ATPase domain protein
phosphoribosylglycinamidine formyltransferase 2, PurT
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TPR repeat-containing protein
hypothetical protein
hypothetical protein
protein of unknown function DUF1568
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flavocytochrome c, heme submit
flavocytochrome c, flavin subunit
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N-terminal BluF domain containing protein
hypothetical lipoprotein
NADH-dependent hydroxyprolyl reductase, HprA
conserved hypothetical outer membrane protein
DnaK co-chaperone, DjA
nucleotide/transferase family protein
phosphotransferase family protein
outer membrane component of lipopolysaccharide assembly complex, LpLpD
outer membrane protein maturation factor, peptide-tyrolyl cis-trans isomerase, SurA
4-hydroxy-L-phenylpyruvate-phosphate dehydrogenase, PhoA
S-adenosylmethionine-6-N-prime-N-prime-adenosyl (rDNA) dimethyltransferase, KsgA
ApaG domain protein
biotin-nucleosyl-tetraphosphatase, ApaH
methyl-accepting chemotaxis protein
conserved hypothetical secreted protein
dihydrofolate reductase, FoaA
conserved hypothetical inner membrane protein
integral membrane protein of unknown function DUF1212
GTP-binding protein, Obg
ribosomal protein L27, RpmA
ribosomal protein L21, RpU
ocaprenyl-diphosphate synthase, IspB
uracil-DNA glycosylase, Ung
octaprenyl-diphosphate synthase, IspB
long-chain-fatty-acid--CoA ligase, FadD
inner membrane 4Fe-4S ferredoxin
sigma-54 dependent transcriptional regulator with sensory PAS domain
thiol:disulfide interchange protein
prepilin peptidase processed protein
uracil-DNA glycosylase, Ung
hydroxyphenylacetaldehyde dehydrogenase, CalB
tetrapeptide repeat-containing protein, Tcr family
curli secretion apparatus outer membrane lipoprotein component, CsgG
curli secretion apparatus component, CsgF
curli secretion apparatus component, CsgE
periplasmic sensor histidine kinase
two component Sigma54 specific transcriptional regulator for nitrogen scavenging, Fis family
ABC transporter, inner membrane subunit
ABC transporter, AT_Pase subunit, HmuD
conserved hypothetical protein
hypothetical protein
universal stress protein family
universal stress protein family
conserved hypothetical protein
coniferyl aldehyde dehydrogenase, CaiB
transcriptional regulator, Tbr family
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curli secretion apparatus component, CsgE
periplasmic sensor histidine kinase
two component Sigma54 specific transcriptional regulator for nitrogen scavenging, Fis family
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ABC transporter, AT_Pase subunit
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type I secretion system, membrane fusion protein, Hnd family
dihydroorotate, homodimeric type, PyrC
hypothetical periplasmic protein
steroid delta-isomerase domain protein
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diguanylate cyclase with small molecule binding domain
glycoside hydrolase, family 73
hypotheal protein SO_3701 MR4_0851 MRT_3171
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SO_3705
nucleoside-proton symporter, NupK SO_3706
membrane protein SO_3708 MR4_0849 MRT_3173 W3181_0945 Sama_2866
ABC cobalamin transporter, periplasmic substrate-binding protein, BtuF
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extracellular thick disulfide interchange protein, DsbA family
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protoporphyrinogen oxidase, HemG_3 SO_3720 MR4_3066 MRT_0906 W3181_0907 Sama_2882
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adenylylsulfate kinase, CysC SO_3723 MR4_3069 MRT_0903 W3181_0905 Sama_2888
sodium/sulfate symporter SO_3724 MR4_3070 MRT_0902 W3181_0904 Sama_2889
sulfate adenylyltransferase, large subunit, CysN SO_3726 MR4_3071 MRT_0901 W3181_0903
sulfate adenylyltransferase, small subunit, CysD SO_3727 MR4_3072 MRT_0900 W3181_0902 Sama_2981
urocytochromo-III C-methyltransferase, CysG SO_3728 MR4_3073 MRT_0899 W3181_0901 Sama_2892
phospholipase A1, PldA SO_3729 MR4_3074 MRT_0888 W3181_0900 Sama_2893
hypothetical protein SO_3731 MR4_3075 MRT_0887 W3181_0899 Sama_2894
expressed periplasmic protein SO_3733 MR4_3076 MRT_0886 W3181_0885 Sama_2895
monofunctional biseynthetc peptidoglycan transglycosylase, MtpA SO_3735 MR4_3077 MRT_0885 W3181_0884
phosphoacetyl-d-sulfate reductase, thiorodoxin-dependent, CysH SO_3736 MR4_3078 MRT_0884 W3181_0883 Sama_2837
sulfite reductase (NADPH), serine FeS subunit, CysI SO_3737 MR4_3079 MRT_0883 W3181_0882 Sama_2838
sulfite reductase (NADPH), flavoprotein subunit, CysJ SO_3738 MR4_3080 MRT_0892 W3181_0881 Sama_2839
NAD(P) transhydrogenase, alpha subunit, PmtA SO_3740 MR4_3081 MRT_0891 W3181_0880 Sama_2840
NAD(P) transhydrogenase, beta subunit, PmtB SO_3741 MR4_3082 MRT_0890 W3181_0879 Sama_2841
transcriptional regulator, TefR family SO_3742 MR4_3083 MRT_0889 W3181_0878 Sama_0736
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lipid A biosynthesis lauril acyltransferase, HtbA SO_3745 MR4_3086 MRT_0886 W3181_0876 Sama_0735
sodium-proton antiporter, CvaA SO_3746 MR4_3087 MRT_0885 W3181_0875 Sama_0730
LiO-transpeptidase, YbB SO_3748 MR4_3091 MRT_0881 W3181_0871 Sama_0728
Zn2-dependent exopeptidase superfamily protein SO_3749 MR4_3092 MRT_0880 W3181_0870 Sama_0725
peptidase, M16 family SO_3750 MR4_3093 MRT_0879 Sama_0724
M16 family peptidase SO_3751 MR4_3094 MRT_0878 Sama_0723
IS3044 transposase, TnpA_IS3044 SO_3752
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AFG1-family ATPase SO_376 MR4_3102 MRT_0870 W3181_0869 Sama_2660
transcriptional regulator, LysR family SO_377 MR4_3106 MRT_0886 W3181_0861 Sama_0693
sodium-dependent bicarbonate transporter, SBT family SO_378 MR4_3107 MRT_0885 W3181_0860 Sama_0692
diquanylate-cyclase with GAF sensory domain SO_379 MR4_3108 MRT_0884 W3181_0865 Sama_0679
[glutamate-ammonia-lyase] adenylyltransferase, GinE SO_3760 MR4_3109 MRT_0863 W3181_0858 Sama_2663
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PagA/M30 family protein SO_3765 MR4_3114 MRT_0858 W3181_0853 Sama_2668
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voltage-gated potassium uptake system, KvaP SO_3768 MR4_3117 MRT_0855 W3181_0850 Sama_2671
adenylate-cyclase like protein, Yoga SO_3769 MR4_3118 MRT_0854 W3181_0849 Sama_2672
phosphate transport accessory protein of unknown function DUF47 SO_3770 MR4_3119 MRT_0853 W3181_0848 Sama_2673
inorganic phosphate transporter, PIP family SO_3771 MR4_3120 MRT_0847 W3181_0847 Sama_2674
SH3 domain protein SO_3772 MR4_3121 MRT_0851 W3181_0846 Sama_2675
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cytoplasmic adenylate cyclase, CyAB SO_3778 MR4_3125 MRT_0840 W3181_0839 Sama_2678
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ATP-dependent RNA helicase, DEAD box family
expressed protein
expressed protein of unknown function
cysteine desulfurase, SufG
sulfur acceptor protein for iron-sulfur cluster assembly, SufE
peptidase, M19 family
FeS assembly ATPase, SuC
conserved hypothetical protein
morn variant repeat protein
conserved hypothetical inner membrane protein
expressed protein of unknown function DUF1696
family U32 unassigned peptidases
ribosomal large subunit pseudouridine synthase, RluA_2
transcriptional regulator, AsnC
extracellular peptidase, family 6A
ABC transporter, inner membrane subunit
ABC transporter, ATPase subunit
3-octaprenyl-4-hydroxybenzoate decarboxylase, UbiX
UDP-N-acetylmyramate-L-alanyl-gamma-D-glutamyl-meso-diaminopimelate ligase, Mpl
sterol desaturase family protein
outer membrane protein, OmpA-like
family 16 outer membrane lipoprotein of unknown function
periplasmic peptidyl-prolyl cis-trans isomerase, PpiA
conserved hypothetical protein
transport protein, AmpG-like
expressed protein of unknown function DUF520
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2-dehydropicolinato-2-reductase, PanE
nitrilotriacetic acid permease P-II family protein, GlnK
ammonium transporter, AminB
signaling protein with EAL domain
transport protein, DMT superfamily
ISS057 transposable, TnpA, ISS057
ISS048 transposable, TnpA, ISS048
periplasmic tetrahydromethanopterin synthase, ltcA
2-dehydro-3-deoxyphosphogluconic acid epimerase, KdpA
sodium dicarboxylate symporter family protein
conserved hypothetical protein
SrfB family protein
GCN5-related N-acetyltransferase
peptide release factor glutamine N5-methylase, HemK
peptide chain release factor 1, PfaA
glutaminyl-RNA reductase, HemA
outer membrane lipoprotein, LoB
4-diphosphoprosteryl-2C-methyl-D-erythritol kinase, IspE
ribosome phosphate pyrophosphokinase, PpaA
methyl-accepting chemotaxis protein
RNA polymerase sigma-70 factor, ECF subfamily
anti-Sigma factor
secreted low complexity protein
ribosomal small subunit pseudouridine synthase, ReuA_2
oligopeptidase lipoprotein, M13 family
(p)ppGpp synthetase, RevE
SMG1/ANR4 family protein
cytoplasmic protein of unknown function
conserved domain protein
transporter, NRAMP family
expressed protein of unknown function DUF1456
beta-aspartyl peptidase, IadA

ABC glutathione transporter, ATPase/inner membrane subunit, CysD
major pilin structural protein, V10-like
expressed protein of unknown function
ATP-D-dependent RNA helicase, DEAD box family
expressed protein
Fe hydrogenase assembly protein, HydG
formate dehydrogenase, cytochrome b, Fdh
periplasmic [Fe-Fe] hydrogenase, small subunit, HydB
periplasmic [Fe-Fe] hydrogenase large subunit, HydA
periplasmic peptidase, subfamily S1B
alanine racemase, biosynthetic, Alr
chemotaxis protein, CheX
TonB-dependent siderophore receptor
Fur regulated PKHD-type oxidase, PluC
Thr-dependent siderophile receptor
chemotaxis protein, CheX
dalanine racemase, biosynthetic, AlaB
replicative DNA helicase, DNAβ
periplasmic peptidase, subfamily S1B
periplasmic [Fe-Fe] hydrogenase large subunit, HydA
periplasmic [Fe-Fe] hydrogenase, small subunit, HydB
formate dehydrogenase, cytochrome b, Fdh
Fe hydrogenase assembly protein, HydG
Fe hydrogenase assembly protein, HydX
Fe hydrogenase assembly protein, HydE
Fe hydrogenase assembly protein, HydF
ribosomal protein L9, Rpl
ribosomal protein S18, RpsR
primosomal replication protein N, PrnB
ribosomal protein S6, RpsP
outer membrane protein of unknown function DU5481
transport protein, MFS superfamily
23S-RNA methyltransferase, RmlB
3-prime to 5-prime exonuclease R, Rnr
flagellar rotation associated molecule, MotX
adenyllylucose synthetase, PurK
conserved hypothetical inner membrane protein, YjeT
ribosomal protein S9, RpsL
ribosomal protein L13, RplM
AFG1-like ATPase
periplasmic serine protease, DegQ
 PTS system nitrogen-specific IIA component, PtsN
sigma-54 modulation protein/ribosomal protein S30E
lipopolysaccharide transport, periplasmic binding component, LptA
LPS biogenesis protein, LptC
arabinose-5-phosphate isomerase, KdsD
3-deoxy-manno-octulosonate-8-phosphatase, KdsC
UDP-N-acetylglucosamine 1-carboxyvinyltransferase, MurA
BiDA/HyaB family protein
phospholipid transport-associated protein, MiaB
periplasmic phospholipid binding protein, MiaC
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ABC phospholipid transporter, inner membrane subunit, MiaE
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arabinose-8-phosphate isomerase, KdsD
lipopolysaccharide transporter, periplasmic binding component, LptA
lipopolysaccharide transporter, ATPase subunit, LptB
RNA polymerase sigma-54 factor, RpoN
phosphocholine transporter NPR, PtsO
magnesium transporter, MgtE_2
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outer membrane lipoprotein
hypothetical protein
transposase domain protein
SsiThr protein kinase
conserved hypothetical lipoprotein
conserved hypothetical inner membrane protein
ammonia-forming nitrite reductase, NrfA
sensor histidine kinase for nitrate/nitrite response, NarQ
two component transcriptional regulator for nitrate/nitrite response, NarP
protein of unknown function UPF0231
CorA-like cation transporter, MIT family
succinylglutamate deaminase/aspartoacylase family protein
aspartokinase III, lysine-sensitive, LysC
conserved hypothetical protein
two component transcriptional regulator for aerobic respiration, ArcA
periplasmic dipeptidylpeptidase IV, Dpp4
fructose-1,6-bisphosphatase, Fbp
hypothetical protein
expressed protein of unknown function
hypothetical inner membrane protein
conserved hypothetical inner membrane protein, UPF0114 family
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ISSod4 transposase, TnpA, ISSod4
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secreted polysaccharide deacetylase
type I secretion system, membrane fusion protein subunit, HlyD family
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type I secretion system, membrane fusion protein, HlyD family
type I secretion system, outer membrane efflux protein
microteaser-processing peptidase 2, TSD
hydrodase, carbon-nitrogen family
expressed protein of unknown function 2099
ribonucleolipid G, Rng
septum formation protein, Maf
cell wall structural complex component, MreB
cell wall structural complex component, MreC
cell wall structural complex component, MreB
MshA pilus-associated adhesin, MshQ
MshA secretion apparatus component, MshP
MshA minor pilin protein, MshQ
MshA minor pilin protein, MshQ
MshA major pilin subunit, MshA
MshA major pilin protein, MshB
MshA biogenesis protein, MshH
MshA plus assembly ATPase, MshE
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ribosomal protein L31, RpmE
expressed periplasmic protein
primosomal replication protein N-prime, PriA
arginyl-tRNA synthetase, ArgS
cell division protein, FtsN
hypothetical protein
SPFH domain/Band 7 family protein
SPFH domain/Band 7 family protein
expressed protein of unknown function DUF107
outer membrane nucleoside transporter, Tss
nucleoside/nucleotide utilization
nonribosomal peptide synthetases, NonRPS
ornithine decarboxylase, ODC
expressed periplasmic protein
TTR repeat protein
transcriptional regulator, LysR family
oxidoreductase, short-chain dehydrogenase/reductase family
periplasmic monoheme cytochrome c
conserved hypothetical outer membrane protein
octaheme tetrahydrofuran reductase, Otr
signalling protein with EAL and C2 domains
type I secretion system, ATPase subunit, HlyB family
type I secretion system, ATPase and inner membrane subunit, HlyB family
type I secretion system, membrane fusion protein subunit, HlyD family
secreted VCBS domain protein
sulfate transporter
secreted polysaccharide deacetylase
conserved hypothetical protein
purine and other phosphorylases, family 1
Na+ dependent nucleoside transporter, NupC family
quinone oxidoreductase family protein
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ABC phosphate transporter, periplasmic ligand-binding subunit, PstS
ABC phosphate transporter, inner membrane subunit, PstC
ABC phosphate transporter, inner membrane subunit, PstA
ABC phosphate transporter, periplasmic ligand-binding subunit, PstS
ISSod1 transposase, TnpA_ISSod1
quinoine oxidoreductase family protein
Na+ dependent nucleoside transporter, NupC family
purine and other phosphorylases, family 1
cAMP binding protein
chloramphenicol O-acetyltransferase, CatB
IS356_1 transposase, TnPA
ATPasE family protein associated with various cellular activities
nickel permease, HupE
HAD-superfamily hydrolase, subfamily IA, variant 1 family protein
integrase/recombinase, XerC
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diaminopimelate epimerase, DapF
periplasmic decaheme cytochrome c, MtrA family
outer membrane protein, MtrB family
surface localized oxidoreductase, molybdopterin-binding lipoprotein subunit
surface localized oxidoreductase, FeS binding subunit
hypothetical lipoprotein
cAMP-binding regulator
hypothetical lipoprotein
surface localized oxidoreductase, FeS binding subunit
surface localized oxidoreductase, molybdopterin-binding lipoprotein subunit
outer membrane protein, MrB family
periplasmic decaheme cytochrome c, MrA family
conserved hypothetical protein
oxidoreductase chaperone/maturatation protein
ATP-dependent DNA helicase, RecG
conserved protein of unknown function
conserved protein in fatty acid biosynthesis locus
expressed protein of unknown function DUF484
diaminopimelate decarboxylase, LysA
expressed lipoprotein
iron donor for FeS cluster assembly, CyaY
adenylate cyclase, CyaA
hydroxymethylbilane synthase, HemC
uroporphyrinogen III synthase, HemD
uroporphyrinogen III synthase, HemX
protoheme synthase protein, HemY
cell surface calcium-binding protein with BNR repeats
type I secretion system, ATPase/C39 family cysteine peptidase component
type I secretion system, membrane fusion protein, HlyD family
type I secretion system, outer membrane component, AgpA
OmpA family lipoprotein
conserved hypothetical periplasmic protein
signalling protein with GGDEF and EAL domains
type I secretion system, Type IV secretion system
conserved hypothetical protein
type I secretion system, membrane fusion protein, RND family
transcriptional regulator, TetR family
bifunctional diguanylate cyclase with GAF sensory domains/signalling protein with EAL domain
ATP-dependent DNA helicase, Rep
transcriptional regulator, TeiR family
type I secretion system, membrane fusion protein, RND family
AcuA/AcrF family protein
expressed protein of unknown function DUF526
conserved hypothetical protein
hypothetical protein
protein of unknown function DUF1006
hypothetical protein
phosphatidylglycerophosphatase B, PgpB
type I secretion system, Type IV secretion system
sodium-dependent transporter, Nss family
inner membrane protein with Tim44 domain
ABC-type transport protein, solute binding component
protein of unknown function UFP0153
cAMP-binding regulator
type I secretion system, Type IV secretion system
phosphatidylglycerophosphatase B, PgpB
type I secretion system, Type IV secretion system
sodium-dependent transporter, Nss family
inner membrane protein with Tim44 domain
expressed protein of unknown function
hypothetical lipoprotein
serine-pyruvate aminotransferase, AgxT
threonine dehydratase, IivA
dihydroxy-acid dehydratase, iivD
acetolactate synthase II, small subunit, iivM
acetolactate synthase II, large subunit, iivG
iivGM operon attenuation leader peptide, iivL
ketol-acid reductoisomerase, iivA
transcriptional regulator, IivY
hemolysin, HlyA
protease, Ila
ABC-type transport protein, solute binding component
protein of unknown function UFP0153
cAMP-binding regulator
type I secretion system, Type IV secretion system
phosphatidylglycerophosphatase B, PgpB
type I secretion system, Type IV secretion system
sodium-dependent transporter, Nss family
inner membrane protein with Tim44 domain
expressed protein of unknown function
hypothetical lipoprotein
serine-pyruvate aminotransferase, AgxT
threonine dehydratase, IivA
dihydroxy-acid dehydratase, iivD
acetolactate synthase II, small subunit, iivM
acetolactate synthase II, large subunit, iivG
iivGM operon attenuation leader peptide, iivL
ketol-acid reductoisomerase, iivA
transcriptional regulator, IivY
hemolysin, HlyA
protease, Ila
ABC-type transport protein, solute binding component
protein of unknown function UFP0153
cAMP-binding regulator
acyltransferase family protein
acetyl carrier protein
membrane protein
AMP-dependent synthetase and ligase
thioester dehydrase family protein
glycerol transferase, family_2
phenylalanine/tyrosine aminotransferase
4-hydroxybenzoate-CoA thioesterase domain protein in fatty acid biosynthesis locus
inner membrane protein in fatty acid biosynthesis locus
FAD-binding protein
conserved lipoprotein in fatty acid biosynthesis locus
beta-ketoacyl synthase
thioester dehydrase family protein
3-oxoacyl-(acyl-carrier-protein) reductase, FabG
3-oxoacyl-(acyl-carrier-protein) synthase II, FabF
conserved periplasmic protein in fatty acid biosynthesis locus
von Willebrand factor type A domain protein
ISSod4 transposase, TnpA_ISSod4
sensor histidine kinase
two component transcriptional regulator
toxin module of toxin-antitoxin system
ISSod3 transposase, TnpA_ISSod3
geranylgeranyl transferase, YsrE
cytoplasmic rhodanese domain protein
hypothetical protein
FMN-dependent NADH-azoreductase, AzolR
thioesterase domain protein, YID
d-tryosyl-(RNA(Tyr))-deacylase, Dtd
protein of unknown function
prolyl aminopeptidase, S33 family
ribonuclease BN, Rbn
conserved hypothetical protein
expressed lipoprotein
iron-sulfur cluster-binding protein
catalase/peroxidase HPI, KatG
diguanylate cyclase
GTP-binding protein, BipA
hypothetical protein
hypothetical protein
pyridoxal-phosphate dependent transferase
DLF1864 domain protein of unknown function
C4-dicarboxylate transporter, DcuB
CHAP domain protein
conserved hypothetical protein
subfamily M23B unassigned peptidases
conserved hypothetical RK-rich protein
TonB-dependent ferric chromobactin receptor
small membrane protein involved in salt tolerance
diguanylate cyclase
RNA pseudouridylate-synthase family protein
periplasmic sensor histidine kinase
two component transcriptional regulator. Winged helix family
expressed periplasmic protein of unknown function
hypothetical protein
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signalling protein with EAL domain
type I plus assembly chaperone, CooB
type I plus major subunit, CooA
ISSod11 transposase, TnpA_ISSod11
ISSod3 transposase, TnpA_ISSod3
formate dehydrogenase, FeS subunit, FdhB_2
formate dehydrogenase, cytochrome b subunit, FdhC_2
TonB-dependent siderophore-like receptor
sodium-dependent transporter, BAS5 family
coprotoporphyrinogen III oxidase, oxygen-independent
Rad51 domain protein
expressed periplasmic protein
iron regulated TonB-dependent receptor, IngA
transcriptional regulator, LysR family
patatin-like phospholipase
peptidase, M16 family
hypothetical inner membrane protein
periplasmic carbohydrate esterase, family 1
hypothetical inner membrane protein
ISSod4 transposase, TnpA_ISSod4
protein of unknown function DUF1568
ISSod14 transposase, TnpA_ISSod14
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conserved hypothetical DTW domain protein
multidrug efflux transporter, DHV1 family
transcriptional regulator, LysR family
methyl-accepting chemotaxis protein with Cache sensory domain
hypothetical protein
Sel1 domain-containing protein
conserved hypothetical inner membrane protein
conserved protein of unknown function
energy transducer for outer membrane transport, TonB
periplasmic ferredoxin, NrfC
periplasmic decalcohol dehydrogenase c, DsmE
hypothetical trimeric cytochrome c
2-succinyl-5-enoylpyruvyl-6-hydroxy-3-cyclohexene-1-carboxylic-acid synthase, MenD
2-succinyl-6-hydroxy-2,4-cyclohexadiene-1-carboxylate synthase, MenH
O-succinylbenzoate-CoA synthase, MenC
O-succinylbenzoic acid-CoA ligase, MenE
signalling protein with EAL domain
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P plus subunit, FimA
ISSod1 transposase, TnpA_ISSod1
ISSod4 transposase, TnpA_ISSod4
RNA polymerase sigma-32 factor, RpoH
cell division ABC transporter, inner membrane subunit, FtsX
cell division ABC transporter, ATPase subunit, FtsE
signal recognition particle docking protein, FtsY
mOGG66-specific 16S rRNA methyltransferase, RemD
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transcriptional regulator, AraC family
isochorismatase family protein
membrane anchored tetraheme cytochrome c, CymA
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radical SAM superfamily protein
heavy metal efflux pump ATPase subunit, CczC
heavy metal efflux pump, inner membrane component, CzCB
heavy metal efflux pump, inner membrane subunit, CysA
ribosome, T2 family
glyoxalase/Bleomycin resistance protein/Dioxygenase superfamily protein
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antitoxin of toxin-antitoxin chromosome stabilization system
antioxidant, AhpC/Tsa family
periplasmic protein of unknown function
two component transcriptional regulator, Winged helix family
conserved hypothetical lipoprotein
periplasmic sensor histidine kinase for osmolarity response, EnvZ
two component transcriptional regulator for porins, OmpR
transcriptional accessory protein, Tex
competence protein, ComF
two component transcriptional regulator, LuxR family
sensor histidine kinase
hypothetical outer membrane protein
sensor histidine kinase
two component transcriptional regulator, Winged helix family
transcriptional regulator, LuxR family
competence protein, ComF
biotin biosynthesis carboxyltransferase, BioH
hypothetical glutamine rich protein
sulfate
transcriptional accessory protein, Tex
transcription elongation factor, GreB
two component transcriptional regulator for porins, OmpR
periplasmic sensor histidine kinase for osmolarity response, EnvZ
methyl-accepting chemotaxis protein
conserved hypothetical lipoprotein
two component transcriptional regulator, Winged helix family
periplasmic sensor histidine kinase
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antioxidant, AhpC/Tsa family
toxin of the toxin/antitoxin chromosome stabilization protein
antitoxin of toxin-antitoxin chromosome stabilization system
expressed protein of unknown function
expressed protein of unknown function
propeptide PepSY amd peptidase M4 domain protein
two component transcriptional regulator, Winged helix family
periplasmic sensor histidine kinase
expressed periplasmic histidine-rich protein
Alpha/Beta hydrolase family of unknown function DUF1234
expressed protein of unknown function
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ABC sulfate/thiosulfate transporter, inner membrane subunit, CysT_2
ABC sulfate/thiosulfate transporter, inner membrane subunit, CysW_2
ABC sulfate/thiosulfate transporter, ATPase subunit, CysA_2
expressed protein of unknown function
sensory box protein with PAS domain
protein of unknown function DUF548
coproporphyrinogen III oxidase, oxygen-independent, HemN
adenosine deaminase, Add
putative lipoprotein of unknown function DUF885
lysophospholipase L2, LysA
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C2b3-type cytochrome oxidase assembly protein, CcoG
expressed protein
naphthoate synthase, MenB
conserved hypothetical inner membrane protein
glutamine-fructose-6-phosphate transaminase (isomerizing), GltS
transcriptional regulator, DeoR
TonB-dependent siderophore receptor
bifunctional N-acetyl glucosamine-1-phosphate uridylyltransferase/glucoamnine-1-phosphate acetyl transferase, GlmU
ATP synthase F1, epsilon subunit, AtpC
ATP synthase F1, beta subunit, AtpD
ATP synthase F1, gamma subunit, AtpG
ATP synthase F1, alpha subunit, AtpA
ATP synthase F1, delta subunit, AtpH
ATP synthase F0, B subunit, AtpF
ATP synthase F0, C subunit, AtpE
ATP synthase F0, A subunit, AtpB
ATP synthase assembly protein, Atpl
chromosome partitioning protein, ParB_1
chromosome partitioning protein, ParA_1
16S rRNA 7-methylguanosine methyltransferase, RsmG
irnA uridine 5-carboxymethylaminomethyl modification enzyme, GidA
protein of unknown function DUF1568
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conserved domain protein
toxin module of toxin-antitoxin system, YafO family
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defective hypothetical protein
response regulator
propahge MuSo1 regulator, Ner_1
DnaJ-class molecular chaperone
conserved hypothetical protein
gsA operon attenuation leader peptide, Phel,
conserved hypothetical inner membrane protein
site-specific recombinase, phage integrase family
conserved hypothetical protein
ISSod25 integrase
hypothetical protein
sucinate dehydrogenase membrane anchor subunit, SdhD
group II intron maturase
hisGD operon attenuation leader peptide, HisL
expressed protein of unknown function
hypothetical secreted protein
conserved hypothetical protein
ISSod23 transposase, TnA, ISSod23
PaqA family protein
propahge MuSo2 conserved hypothetical protein
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toxin module of toxin-antitoxin system, mRNA endonuclease-like, PemK
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hypothesised protein
site-specific recombinase, phage integrase family
site-specific recombinase, phage integrase family
hypothesised protein
periplasmic prolyl oligopeptidase family protein
bacteriocin processing and type I transporter, ATP-binding component
bacteriocin type I transporter, HyD family protein
conserved hypothetical protein
conserved hypothetical protein
ISSod1 transposase, TnpA_ISSod1
hypothetical protein
plasmid protein
hypothetical protein
expressed protein
acetyltransferase, GCN5 family
plasmid stability/partitioning determinant
expressed protein of unknown function
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ISSod4 transposase, TnpA_ISSod4
ISSod1 transposase, TnpA_ISSod1
hypothetical protein
lambda repressor superfamily protein
conserved hypothetical protein
HTH domain DNA-binding protein
conserved hypothetical protein
ISSod34 transposase, TnpA_ISSod34
ISSod6 transposase, TnpA_ISSod6
hypothetical protein
conserved domain protein
recombinase, resolvase family
antitoxin module of toxin-antitoxin system
toxin module of the toxin-antitoxin system, RelE-like
expressed protein
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ISSod4 transposase, TnpA_ISSod4
ISSod8 transposase, TnpA_ISSod8
ISSod1 transposase, TnpA_ISSod1
ISSod8 transposase, TnpA_ISSod8
ISSpu16 resolvase
ISSpu16 antitoxin module of toxin-antitoxin system
ISSpu16 toxin module of toxin-antitoxin system
ISSod3 transposase, TnpA_ISSod3
plasmid partition protein, ParA
plasmid partition protein, ParB
ISSod6 transposase, TnpA_ISSod6
potassium ion transporter, VIC superfamily
periplasmic amidohydrolase family protein
periplasmic metal-dependent aminohydrolase family protein
ISSod3 transposase, TnpA_ISSod3
ISSod4 transposase, TnpA_ISSod4
ISSod8 transposase, TnpA_ISSod8
methyl-accepting chemotaxis protein
conserved hypothetical protein
radical SAM superfamily protein
EAL domain protein
putative surface lipoprotein
outer membrane protein, OmpA family
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**Supplementary Table ST2**: Average Nucleotide Identity (ANI) values calculated for five *Shewanella* strains.

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<th>% ANI</th>
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<td>MR-1</td>
<td>87.70</td>
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Supplementary Table ST3. Calculations of trait similarity across evolutionary distance.

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<th>STRAIN1</th>
<th>STRAIN2</th>
<th>% ANI</th>
<th>16S rRNA</th>
<th>Orthologs</th>
<th>N sources</th>
<th>C sources</th>
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<tr>
<td>MR7</td>
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The plot shows the degree of conservation (% similarity) against evolutionary distance (%ANI) for different trait types.

- Green triangles represent 16S rRNA with an R² of 0.89.
- Light blue triangles represent Orthologs with an R² of 0.76.
- Dark blue triangles represent N sources with an R² of 0.86.
- Red triangles represent C sources.