Table 2. *Halobacterium* NRC-1 genes and genetic elements. The classification heading is bolded and gene names (first column) and predicted gene products (second column) are listed.

	Amino Acid Metabolism
achY	adenosylhomocysteinase
ansA	L-asparaginase
arcA	arginine deiminase
arcB	ornithine carbamoyltransferase
arcC	carbamate kinase
argB	acetylglutamate kinase
argG	argininosuccinate synthetase
argH	argininosuccinate lyase
aroC	chorismate synthase
aroD	3-dehydroquinate dehydratase
aroE	shikimate 5-dehydrogenase
asd	aspartate-semialdehyde dehydrogenase
asnA	asparagine synthetase
aspB1	aspartate aminotransferase
aspB2	aspartate aminotransferase
aspC1	aspartate aminotransferase
aspC2	aspartate aminotransferase
carA	carbamoyl-phosphate synthase small subunit
carB	carbamoyl-phosphate synthase large subunit
cgs	cystathionine gamma-synthase
cysK	cysteine synthase
dapA	dihydrodipicolinate synthase
gabD	succinate-semialdehyde dehydrogenase
gabT	gamma-aminobutyrate aminotransferase
gadD	glutamate decarboxylase
gcvP1	glycine dehydrogenase subunit 1
gcvP2	glycine dehydrogenase subunit 2
gcvT1	aminomethyltransferase
gcvT2	aminomethyltransferase
gdhA1	glutamate dehydrogenase
gdhA2	glutamate dehydrogenase
gdhB	glutamate dehydrogenase
glmS	glutamine-fructose-6-phosphate transaminase
glnA	glutamine synthatase
glyA	glycine hydroxymethyltransferase
hakA	kynureninase
hisA	phosphoribosylformimino-5-aminoimidazole carboxamide ribotide isomerase
hisB	imidazoleglycerol-phosphate dehydratase
hisC1	histidinol-phosphate transaminase
hisC2	histidinol-phosphate transaminase
hisD	histidinol dehydrogenase
hisF	imidazoleglycerol-phosphate synthase
hisG	ATP phosphoribosyltransferase
hisH1	imidazoleglycerol-phosphate synthase
hisH2	imidazoleglycerol-phosphate synthase
hisI	phosphoribosyl-AMP cyclohydrolase
hisJ	N1-(5-phospho-D-ribosyl)-AMP 1,6-hydrolase
hom	homoserine dehydrogenase
hutG	formiminoglutamate hydrolase
hutH	histidine ammonia-lyase
hutI	imidazolone-5-propionate hydrolase
hutU	urocanate hydratase
iluA	threonine dehydratase
lysC	aspartokinase II alpha subunit
mamA	methylaspartate mutase
mamB	methylaspartate mutase
metA	homoserine O-acetyltransferase
metB	cystathionine alpha synthase
nadA	quinolinate synthetase
nadB	L-aspartate oxidase
ocd1	ornithine cyclodeaminase
ocd2	ornithine cyclodeaminase
pheA	prephenate dehydratase
sat	serine acetyltransferase
serA1	phosphoglycerate dehydrogenase
serA2	phosphoglycerate dehydrogenase
serA3	phosphoglycerate dehydrogenase
serB	phosphoserine phosphatase
soxB	sarcosine oxidase
speB	agmatinase
thrB	homoserine kinase
thrC1	threonine synthase
thrC2	threonine synthase
thrC3	threonine synthase
tnaA	tryptophanase
trpA	tryptophan synthase alpha chain
trpB	tryptophan synthase beta chain
trpC	indole-3-glycerol-phosphate synthase
trpD1	phosphoribosyl transferase
trpD2	phosphoribosyl transferase
trpE1	anthranilate synthase alpha chain
trpE2	anthranilate synthase alpha chain
trpF	phosphoribosylanthranilate isomerase
trpG1	anthranilate synthase beta chain
trpG2	anthranilate synthase beta chain
ykfB1	chloromuconate cycloisomerase
ykfB2	chloromuconate cycloisomerase
yrhA	cysteine synthase
yusM	proline dehydrogenase
	Nucleotide Metabolism
adk	adenylate kinase
apt	adenine phosphoribosyltransferase
cda	cytidine aminohydrolase
cmk	cytidydylate kinase
dcd	deoxycytidine triphosphate deaminase
dfp	pantothenate metabolism flavoprotein
dtd	deoxycytidine triphosphate deaminase
galE1	UDP-glucose 4-epimerase
gptA1	purine phosphoribosyltransferase
graD1	glucose-1-phosphate thymidylyltransferase
graD2	glucose-1-phosphate thymidylyltransferase
graD3	glucose-1-phosphate thymidylyltransferase
graD4	glucose-1-phosphate thymidylyltransferase
graD5	glucose-1-phosphate thymidylyltransferase
graD6	glucose-1-phosphate thymidylyltransferase
guaAa	GMP synthase subunit A
guaAb	GMP synthase subunit B
guaB	inosine monophosphate dehydrogenase
imd1	inosine-5'-monophosphate dehydrogenase
imd2	inosine-5'-monophosphate dehydrogenase
ndk	nucleoside diphosphate kinase
nrdA	ribonucleoside reductase small chain
nrdB1	ribonucleoside reductase large chain
nrdB2	ribonucleoside reductase large chain
prsA	ribose phosphate pyrophosphokinase
purA	adenylosuccinate synthase
purB	adenylosuccinate lyase
purC	phosphoribosylaminoimidazole-succinocarboxamide synthase
purD	phosphoribosylglycinamide synthetase
purE	phosphoribosylaminoimidazole carboxylase catalytic subunit
purF	amidophosphoribosylpyrophosphate amidotransferase
purH	Phosphoribosylaminoimidazole-succinocarboxamide formyltransferase
purK	phosphoribosylaminoimidazole carboxylase ATP binding subunit
purL1	phosphoribosylformylglycinamide synthase I
purL2	phosphoribosylformylglycinamide synthase I
purM	phosphoribosylformylglycinamidine cycloligase
purU	formyltetrahydrofolate deformylase
pyrB	aspartate carbamoyltransferase catalytic subunit
pyrC	dihydroorotase
pyrD	dihydroorotate dehydrogenase
pyrE1	orotate phosphoribosyl transferase
pyrE2	orotate phosphoribosyl transferase
pyrF	orotidine-5'-monophosphate (Ura3)
pyrG	CTP synthase
pyrI	aspartate carbamoyltransferase regulatory chain
tdk	thymidine kinase
tmk	thymidylate kinase
trxA1	thioredoxin
trxA2	thioredoxin
trxB1	thioredoxin reductase
trxB2	thioredoxin reductase
txrB3	thioredoxin reductase
udg1	UDP-glucose dehydrogenase
udp1	uridine phosphorylase
udp2	uridine phosphorylase
urk	uridine kinase
ush	UDP-sugar hydrolase
	Cofactor Metabolism
birA	biotin acetyl-CoA carboxylase ligase
cbiA	cobyrinic acid a,c-diamide synthase
cbiC	precorrin isomerase
cbiF	cobalamin biosynthesis
cbiG	cobalamin biosynthesis
cbiH	cobalamin biosynthesis
cbiJ	precorrin-3 methylase
cbiL	cobalamin biosynthesis
cbiM	cobalamin biosynthesis protein
cbiP	cobyric acid synthase
cbiT	cobalamin biosynthesis
cobH	cobalamin biosynthesis
cobI	cobalamin adenosyltransferase
cobN	cobalamin biosynthesis protein
ctaB	heme synthase
cysG	uroporphyrin-III C-methyltransferase
entB	isochorismatase
gdb	molybdopterin-guanine dinucleotide biosynthesis protein
hem2	porphobilinogen synthase
hem3	porphobilinogen deaminase
hemK	protoporphyrinogen oxidase
hemL	glutamate-1-semialdehyde aminotransferase
hhoA	4-hydroxybenzoate octaprenyltransferase
hmcA	protoporphyrin IX magnesium chelatase
hmoA	molybdopterin oxidoreductase
hxyA	monooxygenase
lipB	lipoate protein ligase
menA	menaquinone biosynthesis
menB	dihydroxynaphthoic acid synthase
menD	2-succinyl-6-hydroxy-2,4-cyclohexadiene-1-carboxylate synthase
menF	isochorismate synthase
moaA	molybdenum cofactor biosynthesis protein
moaB	molybdenum cofactor biosynthesis protein
moaC	molybdenum cofactor biosynthesis protein
moaE	molybdenum cofactor biosynthesis protein
moeA1	molybdenum cofactor biosynthesis protein
moeA2	molybdenum cofactor biosynthesis protein
moeB	molybdenum cofactor biosynthesis protein
nadC	quinolinate phosphoribosyltransferase
nadE	NAD^+ synthetase
nirD	heme biosynthesis protein
nirH	heme biosynthesis protein
nirJ	heme biosynthesis protein
pqqE	coenzyme PQQ synthesis protein
ribA	GTP cyclohydrolase II
ribC	riboflavin synthase alpha subunit
ribE	riboflavin synthase beta subunit
ribG	riboflavin-specific deaminase
thi1	thiamine biosynthetic enzyme
thiC	thiamine biosynthesis protein
thiD	hydroxymethylpyrimidine phosphate kinase
thiL	thiamine monophosphate kinase
uroM	S-adenosyl-L-methionine:uroporphyrinogen III methyltransferase
yfkN	2',3'-cyclic-nucleotide 2'-phosphodiesterase
yfmJ	quinone oxidoreductase
	Energy Metabolism
aad	aryl-alcohol dehydrogenase
acs1	acetyl-CoA synthetase
acs2	acetyl-CoA synthetase
acs3	acetyl-CoA synthetase
adh1	alcohol dehydrogenase
adh2	alcohol dehydrogenase
adh3	alcohol dehydrogenase
adh4	alcohol dehydrogenase
atpA	H^+-transporting ATP synthase subunit A
atpB	H^+-transporting ATP synthase subunit B
atpC	H^+-transporting ATP synthase subunit C
atpD	H^+-transporting ATP synthase subunit D
atpE	H^+-transporting ATP synthase subunit E
atpF	H^+-transporting ATP synthase subunit F
atpI	H^+-transporting ATP synthase subunit I
atpK	H^+-transporting ATP synthase subunit K
aup	acetoin utilization protein
can	aconitase
cat	4-hydroxybutyrate CoA transferase
celM	endoglucanase
citE	citrate (pro-3S)-lyase
citZ	citrate synthase
coxA1	cytochrome *c* oxidase subunit I
coxA2	cytochrome *c* oxidase subunit I
coxB1	cytochrome *c* oxidase subunit II
coxB2	cytochrome *c* oxidase subunit II
coxC	cytochrome *c* oxidase subunit III
cyb	cytochrome b_6
cyc	cytochrome P450
cydA	cytochrome *d* oxidase chain I
cydB	cytochrome *d* oxidase chain II
deoC	deoxyribose-phosphate aldolase
dhpS	dihydropteroate synthase
dld	D-lactate dehydrogenase
dmsA	dimethylsulfoxide reductase
dsa	dihydrolipoamide S-acetyltransferase
eno	phosphopyruvate hydratase
etfA	electron transfer flavoprotein subunit alpha
etfB	electron transfer flavoprotein subunit beta
fbp	fructose-bisphosphatase
ferA1	ferredoxin
ferA2	ferredoxin
ferA3	ferredoxin
ferB	ferredoxin
folP	dihydropteroate synthase
fprA	flavoprotein
fucA	fuculose-1-phosphate aldolase
fumC	fumarate hydratase
gapA	glyceraldehyde-3-phosphate dehydrogenase
gapB	glyceraldehyde-3-phosphate dehydrogenase
gcd	glucose dehydrogenase
gdcH	glycine decarboxylase complex h-protein
glcD	glycolate oxidase subunit
glcK	glucose kinase
gldA	sn-glycerol-1-phosphate dehydrogenase

glpK	glycerol kinase
gpdA1	glycerol-3-phosphate dehydrogenase chain A
gpdA2	glycerol-3-phosphate dehydrogenase chain A
gpdB	glycerol-3-phosphate dehydrogenase chain B
gpdC	glycerol-3-phosphate dehydrogenase chain C
gpm	phosphoglycerate mutase
hpcE	2-hydroxyhepta-2,4-diene-1,7-dioate isomerase
icd	isocitrate dehydrogenase, NADP
ipp	inorganic pyrophosphatase
kdgK	2-keto-3-deoxygluconate kinase
korA	putative 2-ketoglutarate ferredoxin oxidoreductase alpha
korB	putative 2-ketoglutarate ferredoxin oxidoreductase beta
lip	lipoic acid synthase
lpdA	dihydrolipoamide dehydrogenase
mal	methylaspartate ammonia-lyase
manC	mannose-1-phosphate guanylyltransferase
mcmA1	methylmalonyl-CoA mutase, subunit alpha
mcmA2	methylmalonyl-CoA mutase, subunit alpha
mcmA3	methylmalonyl-CoA mutase, subunit alpha
mdh	malate dehydrogenase
mdhA	L-malate dehydrogenase
mmdA	methylmalonyl-CoA decarboxylase, subunit alpha
moxR	methanol dehydrogenase regulatory protein
moz	molybdopterin oxidoreductase
ndhG1	NADH dehydrogenase/oxidoreductase
ndhG2	NADH dehydrogenase/oxidoreductase
ndhG3	NADH dehydrogenase/oxidoreductase
ndhG4	NADH dehydrogenase/oxidoreductase
ndhG5	NADH dehydrogenase/oxidoreductase
nuoL	$F420H_2$:quinone oxidoreductase chain L
nuoM	$F420H_2$:quinone oxidoreductase chain M
pdhA1	pyruvate dehydrogenase alpha subunit
pdhA2	pyruvate dehydrogenase alpha subunit
pdhB	pyruvate dehydrogenase beta subunit
pgi	glucose-6-phosphate isomerase
pgk	3-phosphoglycerate kinase
pho2	p-nitrophenyl phosphatase
pmm	phosphoglucomutase/phospho-mannomutase
porA	pyruvate ferredoxin oxidoreductase, subunit alpha
porB	pyruvate ferredoxin oxidoreductase, subunit beta
ppiA	peptidyl-prolyl isomerase
ppsA	phosphoenolpyruvate synthase
pykA	pyruvate kinase
rpi	ribose 5-phosphate isomerase
sdhA	succinate dehydrogenase subunit A
sdhB	succinate dehydrogenase subunit B
sdhC	succinate dehydrogenase subunit C
sucC	succinyl-CoA synthetase beta chain
sucD	succinyl-CoA synthetase alpha chain
suk	sugar kinase
tpiA	triosephosphate isomerase
yafB	aldehyde reductase
yjlD	NADH dehydrogenase
ykhA	acyl-CoA hydrolase
yngE	propionyl-CoA carboxylase homolog
yqeC	6-phosphogluconate dehydrogenase
yqjM	NADH-dependent flavin oxidoreductase
ywfD	glucose 1-dehydrogenase

Cell Envelope Components

acaB1	3-ketoacyl-CoA thiolase
acaB2	3-ketoacyl-CoA thiolase
acc	biotin carboxylase
acd1	acyl-CoA dehydrogenase
acd2	acyl-CoA dehydrogenase
acd3	acyl-CoA dehydrogenase
acd4	acyl-CoA dehydrogenase
acd5	acyl-CoA dehydrogenase
act	acyl-CoA thioester hydrolase
aldY1	aldehyde dehydrogenase (retinol)
aldY2	aldehyde dehydrogenase (retinol)
alkK	medium-chain acyl-CoA ligase
bchP	geranylgeranyl hydrogenase
bop	bacteriorhodopsin
brp	bacteriorhodopsin related protein
crt	carotenoid biosynthetic protein
crtB1	phytoene synthase
crtB2	phytoene synthase
crtI1	phytoene dehydrogenase
crtI2	phytoene dehydrogenase
crtI3	phytoene dehydrogenase
csg	cell surface glycoprotein precursor
dpg	dolichol-P-glucose synthetase
est	carboxylesterase
exoM	succinoglycan biosynthesis protein
exsB	succinoglycan biosynthesis
fabG	3-oxoacyl-[acyl-carrier-protein] reductase
fad1	enoyl-CoA hydratase
fad2	enoyl-CoA hydratase
fdfT	farnesyl-diphosphate farnesyltransferase
fps	putative isopentenyl pyrophosphate isomerase
galE1	UDP-glucose 4-epimerase
galE2	UDP-glucose 4-epimerase
gcdH	glutaryl-CoA dehydrogenase
ggt	geranylgeranyl-diphosphate geranylgeranyltransferase
gmd	GDP-D-mannose dehydratase
hbd1	3-hydroxyacyl-CoA dehydrogenase
hbd2	3-hydroxyacyl-CoA dehydrogenase
hop	halorhodopsin
idi	isopentenyl pyrophosphate isomerase
ids	bifunctional short chain isoprenyl diphosphate synthase
idsA	geranylgeranyl diphosphate synthase
ilvE1	branched-chain amino acid aminotransferase
ilvE2	branched-chain amino acid aminotransferase
lpb	LPS biosynthesis protein
lpg	LPS glycosyltransferase
mvaA	3-hydroxy-3-methylglutaryl-coenzyme A reductase
mvaB	3-hydroxy-3-methylglutaryl-coenzyme A synthase
mvk	mevalonate kinase
pan1	membrane protein
pgsA	CDP-diacylglycerol-glycerol-3-phosphate 3-phosphatidyltransferase
pssA	CDP-diacylglycerol-serine O-phosphatidyltransferase
rfbQ	rhamnosyl transferase
sgb	succinoglycan biosynthesis transport protein
sop1	sensory rhodopsin I
sop2	sensory rhodopsin II
ugd	UDP-glucose dehydrogenase
ybjG	membrane protein
ycdH	adhesion protein

Transport

appB	oligopeptide ABC permease
appC	oligopeptide transport permease protein
appF	oligopeptide ABC transporter ATP-binding
arsA1	arsenical pump-driving ATPase
arsA2	arsenical pump-driving ATPase
arsB	arsenite transport protein
caa	cation antiporter
cat1	cationic amino acid transporter
cat2	cationic amino acid transporter
cat3	cationic amino acid transporter
cat4	cationic amino acid transporter
cbiN	cobalt transport protein
cbiO1	cobalt transport ATP-binding protein
cbiO2	cobalt transport ATP-binding protein
cbiQ	cobalt transport protein
cef	cation efflux system protein (zinc/cadmium)
clc	chloride channel
cpx	heavy-metal transporting CPx-type ATPase
cysA	sulfate transport system ATP-binding protein
cysT1	sulfate transport system permease protein
cysT2	sulfate transport system permease protein
dppA	dipeptide ABC transporter dipeptide-binding
dppB1	dipeptide ABC transporter permease
dppB2	dipeptide ABC transporter permease
dppC1	dipeptide ABC transporter permease
dppC2	dipeptide ABC transporter permease
dppD	dipeptide ABC transporter ATP-binding
dppF	dipeptide ABC transporter ATP-binding
fepC	ferric enterobactin transport protein
fhuG	ferrichrome ABC transporter permease
gltP	proton/sodium-glutamate symport protein
hemU	iron (III) ABC transporter permease
hemV1	iron (III) ABC transporter ATP-binding
hemV2	iron (III) ABC transporter ATP-binding
ibp	iron-binding protein
iucA	iron transport protein A
iucB	iron transport protein B
iucC	iron transport protein C
kdpA	potassium-transporting ATPase A chain
kdpB	potassium-transporting ATPase B chain
kdpC	potassium-transporting ATPase C chain
lctP	L-lactate permease
nac	sodium- and chloride-dependent transporter
nce	Na^+/Ca^{2+}-exchanging protein
nhaC1	Na^+/H^+ antiporter
nhaC2	Na^+/H^+ antiporter
nhaC3	Na^+/H^+ antiporter
nifU	nitrogen fixation protein
nosF1	copper transport ATP-binding protein
nosF2	copper transport ATP-binding protein
nosY	nitrite/nitrate reduction protein
oppD1	oligopeptide ABC transporter ATP-binding
oppD2	oligopeptide ABC transporter ATP-binding
opuD	glycine betaine transporter
oxlT	oxalate/formate antiporter
panF	pantothenate permease
phnC	phosphonates transport ATP-binding
phoT1	sodium dependent phosphate transporter
phoT2	sodium dependent phosphate transporter
phoT3	sodium dependent phosphate transporter
phoX	phosphate ABC transporter periplasmic phosphate-binding
potA1	spermidine/putrescine ABC transporter ATP-binding
potA2	spermidine/putrescine ABC transporter ATP-binding
potB	spermidine/putrescine ABC transporter permease
potC	spermidine/putrescine ABC transporter permease
potD	spermidine/putrescine-binding protein
proX	putative ABC transporter
pstA1	phosphate ABC transporter permease
pstA2	phosphate ABC transporter permease
pstB1	phosphate ABC transporter ATP-binding
pstB2	phosphate ABC transporter ATP-binding
pstC1	phosphate ABC transporter permease
pstC2	phosphate ABC transporter permease
putP	proline permease
rbsA	ribose ABC transporter ATP-binding
rbsC1	ribose ABC transporter permease
rbsC2	ribose ABC transporter permease
sfuB	iron transporter-like protein
trkA1	TRK potassium uptake system protein
trkA2	TRK potassium uptake system protein
trkA3	TRK potassium uptake system protein
trkA4	TRK potassium uptake system protein
trkA5	TRK potassium uptake system protein
trkA6	TRK potassium uptake system protein
trkH1	TRK potassium uptake system protein
trkH2	TRK potassium uptake system protein
trkH3	TRK potassium uptake system protein
trp1	ABC transport protein
trp2	ABC transport protein
trp3	daunorubicin resistance ABC transporter ATP-binding protein
trp4	ABC transporter, ATP-binding protein
trp5	ABC transporter, ATP-binding protein
trp6	daunorubicin resistance ABC transporter ATP-binding protein
trp7	putative transporter
trsE	transfer complex protein
ugpA	sn-glycerol-3-phosphate transport system permease
ugpB	glycerol-3-phosphate-binding protein precursor
ugpC	sn-glycerol-3-phosphate transport system ATP-binding
ugpE	sn-glycerol-3-phosphate transport system permease
ybhF	ABC-type transport protein
yfmD1	ferrichrome ABC transporter permease protein
yfmD2	ferrichrome ABC transporter permease protein
yfmF	ferrichrome ABC transporter ATP-binding protein
yfmO1	multidrug resistance protein homolog
yfmO2	multidrug resistance protein homolog
yhdG	amino acid transporter
ykfD	oligopeptide ABC transporter ATP-binding
ylnA	anion permease
yocR	sodium-dependent transporter
yqgG	phosphate ABC transporter binding
yufN	ABC transporter (lipoprotein)
yurY	ABC transporter, ATP-binding protein
yusZ1	oxidoreductase
yusZ2	oxidoreductase
yusZ3	oxidoreductase
yvgX	molybdenum-binding protein
yvrO	amino acid ABC transporter, ATP-binding protein
zntA	zinc-transporting ATPase
zurA	ABC transporter, ATP-binding protein
zurM	ABC transporter, permease protein

Cellular Processes

afsQ2	sensory histidine protein kinase homolog
ark	adaptive-response sensory-kinase
cctA	thermosome subunit alpha
cctB	thermosome subunit beta
cdc48a	cell division cycle protein
cdc48b	cell division cycle protein
cdc48c	cell division cycle protein
cdc48d	cell division cycle protein
cdc48e	cell division cycle protein
cheA	chemotaxis protein
cheB	chemotaxis protein
cheC1	chemotaxis protein
cheC2	chemotaxis protein
cheD	chemotaxis protein
cheR	chemotaxis protein
cheW1	chemotaxis protein
cheW2	chemotaxis protein
cheY	chemotaxis protein
cspD1	cold shock protein
cspD2	cold shock protein
dnaJ	heat shock protein
dnaK	heat shock protein
dpa	signal recognition particle receptor
dpsA	starvation induced DNA binding protein
fabE	flagella-related protein E
fapH	flagella-related protein H
fapJ	flagella accessory protein J
flaA1a	flagellin A1 precursor
flaA1b	flagellin A1 precursor
flaA2	flagellin A2 precursor
flaB1	flagellin B1 precursor
flaB2	flagellin B2 precursor
flaB3	flagellin B3 precursor
ftsZ1	cell division protein
ftsZ2	cell division protein
ftsZ3	cell division protein
ftsZ4	cell division protein
ftsZ5	cell division protein
ftsJ	cell division protein
grpE	heat shock protein
gsp	general stress protein 69
gspE1	type II secretion system protein
gspE2	type II secretion system protein
gspE3	type II secretion system protein
gvpA1	GvpA protein, clusterA
gvpA2	GvpA protein, cluster B
gvpC1	GvpC protein, cluster A
gvpC2	GvpC protein, cluster B
gvpD1	GvpD protein, cluster A
gvpD2	GvpD protein, cluster B
gvpE1	GvpE protein, cluster A
gvpE2	GvpE protein, cluster B
gvpF1	GvpF protein, cluster A
gvpF2	GvpF protein, cluster B
gvpG1	GvpG protein, cluster A
gvpG2	GvpG protein, cluster B
gvpH1	GvpH protein, cluster A
gvpH1	GvpH protein, cluster B

gvpI1	GvpI protein, cluster A
gvpI2	GvpI protein, cluster B
gvpJ1	GvpJ protein, cluster A
gvpJ2	GvpJ protein, cluster B
gvpK1	GvpK protein, cluster A
gvpK2	GvpK protein, cluster B
gvpL1	GvpL protein, cluster A
gvpL2	GvpL protein, cluster B
gvpM1	GvpM protein, cluster A
gvpN1	GvpN protein, cluster A
gvpN2	GvpN protein, cluster B
gvpO1	GvpO protein, cluster A
gvpO2	GvpO protein, cluster B
hacA	atrazine chlorohydrolase
hsp1	heat shock protein
hsp2	heat shock protein
hsp3	heat shock protein
hsp4	heat shock protein
hsp5	heat shock protein
htr1	Htr1 transducer
htr2	Htr2 transducer
htr3	Htr3 transducer
htr4	Htr4 transducer
htr5	Htr5 transducer
htr6	Htr6 transducer
htr7	Htr7 transducer
htr8	Htr8 transducer
htr9	Htr9 transducer
htr10	Htr10 transducer
htr12	Htr12 transducer
htr13	Htr13 transducer
htr14	Htr14 transducer
htr15	Htr15 transducer
htr16	Htr16 transducer
htr17	Htr17 transducer
htr18	Htr18 transducer
htrA	serine proteinase
hyrA	alkyl hydroperoxide reductase
kaiC	circadian regulator
mcm	MCM / cell division control protein 21
merA	mercury(II) reductase
minD1	cell division inhibitor
minD2	cell division inhibitor
noxA	NADH oxidase
noxC	NADH oxidase
orc1	orc / cell division control protein 6
orc2	orc / cell division control protein 6
orc3	orc / cell division control protein 6
orc4	orc / cell division control protein 6
orc5	orc / cell division control protein 6
orc6	orc / cell division control protein 6
orc7	orc / cell division control protein 6
orc8	orc / cell division control protein 6
orc9	orc / cell division control protein 6
pelA	cell division protein pelota
perA	peroxidase / catalase
psmA	proteasome, subunit alpha
psmB	proteasome, subunit beta
rrt	7s RNA
rspA	starvation sensing protein
sec11	signal sequence peptidase
secD	protein-export membrane protein
secE	protein translocase
secF	protein-export membrane protein
secY	protein translocase
smc1	chromosome segregation
sojA	Spo0A activation inhibitor
sojB	Spo0A activation inhibitor
sojC1	Spo0A activation inhibitor
sojC2	Spo0A activation inhibitor
sojD	Spo0A activation inhibitor
sojE	Spo0A activation inhibitor
srp19	signal recognition particle
srp54	signal recognition particle
surE	stationary phase survival protein
tatC1	protein export
tatC2	protein export
trzA	N-ethylammeline chlorohydrolase

DNA Replication, Repair, and Recombination

alkA	3-methyladenine DNA glycosylase
dinF	DNA damage-inducible protein
dip1	DNA damage-inducible protein
dip2	DNA damage-inducible protein
dip3	competence-damage protein CinA-like
gyrA	DNA gyrase subunit A
gyrB	DNA gyrase subunit B
hel	DNA helicase
hjr	holliday junction resolvase
hpyA	archaeal histone A1
lig	DNA ligase
mutL	DNA mismatch repair protein
mutS1	mismatch repair protein
mutS2	mismatch repair protein
mutS3	mismatch repair protein
mutT	mismatch repair protein
mutY	A/G specific adenine glycosylase, repair protein
nfi	endonuclease V
nthA1	endonuclease III
nthA2	endonuclease III
nthB	endonuclease III
ogg	8-oxoguanine DNA glycosylase
pcn	proliferating-cell nuclear antigen
phr1	photolyase/cryptochrome
phr2	photolyase/cryptochrome
polA1	DNA polymerase type II small chain
polA2	DNA polymerase type II large chain
polB1	DNA polymerase B1
polB2	DNA polymerase B2
polC	DNA polymerase bacteriophage-type
pri	DNA primase
rad2	DNA repair protein
rad24a	DNA repair protein
rad24b	DNA repair protein
rad24c	DNA repair protein
rad25	DNA repair protein
rad3a	helicase
rad3b	helicase
radA1	DNA repair protein
radA2	DNA repair protein
repH	replication protein
repI	replication protein
repJ	replication protein
rfcA	replication factor C small subunit
rfcC	replication factor C small subunit
rfcB	replication factor C large subunit
rhl	repair helicase
rmeM	type I restriction-modification enzyme, M subunit
rmeS	type I restriction-modification enzyme, S subunit
rmeR	type I restriction-modification enzyme, R subunit
rnh	RNAase H
rpa	replication A related protein
sod1	superoxide dismutase
sod2	superoxide dismutase
ssrA	integrase/recombinase
top6A	DNA topoisomerase VI subunit A
top6B	DNA topoisomerase VI subunit B
topA	DNA topoisomerase I
uvrA	excision nuclease chain A
uvrB	excision nuclease chain B
uvrC	excision nuclease chain C
uvrD	repair helicase
xthA	endonuclease IV
yhcR	phosphoesterase
yqjH	trans lesion repair
zim	CTAG modification methylase

Transcription

brr2	pre-mRNA splicing helicase
cca	tRNA nucleotidyltransferase
endA	tRNA intron endonuclease
epf1	mRNA 3'-end processing factor homolog
epf2	mRNA 3'-end processing factor homolog
nusA	transcription termination-antitermination factor
nusG	transcription termination-antitermination factor
rpb3	DNA-directed RNA polymerase II
rpoA	DNA-directed RNA polymerase subunit A
rpoB'	DNA-directed RNA polymerase subunit B'
rpoB''	DNA-directed RNA polymerase subunit B"
rpoC	DNA-directed RNA polymerase subunit C
rpoE'	DNA-directed RNA polymerase subunit E'
rpoE''	DNA-directed RNA polymerase subunit E"
rpoH	DNA-directed RNA polymerase subunit H
rpoK	DNA-directed RNA polymerase subunit K
rpoL	DNA-directed RNA polymerase subunit L
rpoM	DNA-directed RNA-polymerase subunit M
rpoN	DNA-directed RNA polymerase subunit N
snp	snRNP homolog
tbpA	transcription initiation factor IID
tbpB	transcription initiation factor IID
tbpC	transcription initiation factor IID
tbpD	transcription initiation factor IID
tbpE	transcription initiation factor IID
tbpF	transcription initiation factor IID
tfbA	transcription initiation factor IIB
tfbB	transcription initiation factor IIB
tfbC	transcription initiation factor IIB
tfbD	transcription initiation factor IIB
tfbE	transcription initiation factor IIB
tfbF	transcription initiation factor IIB
tfbG	transcription initiation factor IIB
tfeA	transcription initiation factor IIE alpha subunit
vacB	ribonuclease II family protein

Regulation

arcR	transcription regulator
arsC	transcription regulator
arsD	arsenic resistence repressor
arsR	transcription regulator
asnC	transcription regulator
bat	bacterio-opsin activator
birA	biotin operon-like repressor
cinR	transcription repressor
hlx1	HoxA-like transcriptional regulator
hlx2	HoxA-like transcriptional regulator
hrg	transcriptional regulatory protein homolog
idr1	iron-dependent repressor homolog
idr2	iron-dependent repressor homolog
pai1	sporulation regulator homolog
phoR	PhoR protein homolog
phoU	transcriptional regulator
phrH	PhiH1 repressor homolog
prp1	phosphate regulatory protein homolog
prrC	regulatory protein
sirR	transcription repressor
trh1	transcription regulator
trh2	transcription regulator
trh3	transcription regulator
trh4	transcription regulator
trh5	transcription regulator
trh6	transcription regulator
trh7	transcription regulator
troR	iron-dependent repressor

Translation

alaS	alanyl-tRNA synthetase
argS	arginine-tRNA synthetase
aspS	aspartyl-tRNA synthetase
cna	proliferating-cell nucleolar antigen
cysS	cysteinyl-tRNA synthetase
drg	GTP-binding protein DRG
dys	deoxyhypusine synthase
eef1a	translation elongation factor eEF-1A subunit alpha
eef1b	translation elongation factor eEF-1 subunit beta
eef2	translation elongation factor eEF-2
eif1a1	translation initiation factor eIF-1A
eif1a2	translation initiation factor eIF-1A
eif2a	translation initiation factor eIF-2 subunit alpha
eif2b	translation initiation factor eIF-2 subunit beta
eif2ba	translation initiation factor eIF-2B subunit alpha
eif2bd	translation initiation factor eIF-2B subunit delta
eif2g	translation initiation factor eIF-2 subunit gamma
eif4a	ATP-dependent RNA helicase homolog eIF-4A
eif5a	translation initiation factor eIF-5A
erf1	peptide chain release factor eRF-1
fib	fibrillarin
gatA	Glu-tRNA amidotransferase
gatB1	Glu-tRNA amidotransferase
gatB2	Glu-tRNA amidotransferase
gatC	Glu-tRNA amidotransferase subunit C
gltS	glutamyl-tRNA synthetase
glyS	glycine-tRNA synthetase
helA	ATP-dependent helicase
hemA	glutamyl-tRNA reductase
hepA	ATP-dependent RNA helicase
hisS	histidyl-tRNA synthetase
hypE	hydrogenase expression/formation protein
ileS	isoleucyl-tRNA synthetase
infB	bacterial-like IF2
ksgA	dimethyladenosine transferase
leuS	leucine-tRNA synthetase
lysS	lysyl-tRNA synthetase
map	methionyl aminopeptidase
metS	methionine-tRNA synthetase
nop58	archaeal nucleolar protein homolog
pheS	phenylalanyl-tRNA synthetase subunit alpha
pheY	phenylalanyl-tRNA synthetase subunit beta
pimT1	L-isoaspartyl protein carboxyl methyltransferase
pimT2	L-isoaspartyl-protein carboxyl methyltransferase
proS	proline-tRNA synthetase
rfbU1	LPS biosynthesis
rfbU2	LPS biosynthesis
rimI	Pab N-terminal acetyltransferase
rimK	ribosomal protein S6 modification protein
rnpB	RNase P
rpl1p	50S ribosomal protein L1P
rpl2p	50S ribosomal protein L2P
rpl3p	50S ribosomal protein L3P
rpl4e	50S ribosomal protein L4E
rpl5p	50S ribosomal protein L5P
rpl6p	50S ribosomal protein L6P
rpl10e	50S ribosomal protein L10E
rpl10p	50S ribosomal protein L10P
rpl11p	50S ribosomal protein L11P
rpl12p	50S ribosomal protein L12P
rpl13p	50S ribosomal protein L13P
rpl14p	50S ribosomal protein L14P
rpl15e	50S ribosomal protein L15E
rpl15p	50S ribosomal protein L15P
rpl18e	50S ribosomal protein L18E
rpl18p	50S ribosomal protein L18P
rpl19e	50S ribosomal protein L19E
rpl21e	50S ribosomal protein L21E
rpl22p	50S ribosomal protein L22P
rpl23p	50S ribosomal protein L23P
rpl24e	50S ribosomal protein L24E
rpl24p	50S ribosomal protein L24P
rpl29p	50S ribosomal protein L29P
rpl30p	50S ribosomal protein L30P
rpl31e	50S ribosomal protein L31E
rpl32e	50S ribosomal protein L32E
rpl37e	50S ribosomal protein L37E
rpl39e	50S ribosomal protein L39E
rpl40e	50S ribosomal protein L40E
rpl44e	50S ribosomal protein L44E
rps2p	30S ribosomal protein S2P
rps3e	30S ribosomal protein S3E
rps3p	30S ribosomal protein S3P
rps4e	30S ribosomal protein S4E
rps4p	30S ribosomal protein S4P
rps5p	30S ribosomal protein S5P
rps6e	30S ribosomal protein S6E
rphs6	30S ribosomal protein HS6
rps7p	30S ribosomal protein S7P
rps8e	30S ribosomal protein S8E
rps8p	30S ribosomal protein S8P
rps9p	30S ribosomal protein S9P
rps10p	30S ribosomal protein S10P
rps11p	30S ribosomal protein S11P
rps12p	30S ribosomal protein S12P
rps13p	30S ribosomal protein S13P
rps14p	30S ribosomal protein S14P
rps15p	30S ribosomal protein S15P
rps17e	30S ribosomal protein S17E
rps17p	30S ribosomal protein S17P
rps19e	30S ribosomal protein S19E
rps19p	30S ribosomal protein S19P
rps24e	30S ribosomal protein S24E
rps27ae	30S ribosomal protein S27AE
rps27e	30S ribosomal protein S27E

rps28e	30S ribosomal protein S28E
rrlA	23S rRNA
rrlB	5s rRNA
rrs	16S rRNA
serS	serine-tRNA synthetase
sus	tRNA-pseudouridine synthase
tgtA1	archaeosine tRNA-ribosyltransferase
tgtA2	archaeosine tRNA-ribosyltransferase
thrS	threonyl-tRNA synthetase
trm1	N2,N2-dimethylguanosine tRNA methyltransferase
trn1	Phe-tRNA-GAA
trn2	Val-tRNA-TAC
trn3	Arg-tRNA-GCG
trn4	Asn-tRNA-GTT
trn5	Ile-tRNA-CAT
trn6	Tyr-tRNA-GTA
trn7	Ser-tRNA-CGA
trn8	Gln-tRNA-TTG
trn9	Met-tRNA-initiation
trn10	Arg-tRNA-TCG
trn11	Ala-tRNA-GGC
trn12	Arg-tRNA-CCT
trn13	Gly-tRNA-TCC
trn14	Lys-tRNA-CTT
trn15	Trp-tRNA-CCA
trn16	Thr-tRNA-CGT
trn17	Ser-tRNA-GCT
trn18	Leu-tRNA-CAG
trn19	Thr-tRNA-TCT
trn20	Ser-tRNA-TGA
trn21	Glu-tRNA-TTC
trn22	Glu-tRNA-CTC
trn23	Leu-tRNA-CAA
trn24	Leu-tRNA-TAG
trn25	Leu-tRNA-GAG
trn26	Val-tRNA-CAC
trn27	Met-tRNA-CAT
trn28	Val-tRNA-GAC
trn29	Gly-tRNA-GCC
trn30	Pro-tRNA-GGG
trn31	Ile-tRNA-GAT
trn32	Leu-tRNA-TAA
trn33	Pro-tRNA-CGG
trn34	Gly-tRNA-CCC
trn35	Thr-tRNA-GGT
trn36	Ser-tRNA-GGA
trn37	His-tRNA-GTG
trn38	Pro-tRNA-TGG
trn39	Gln-tRNA-CTG
trn40	Arg-tRNA-TCT
trn41	Ala-tRNA-TGC
trn42	Cys-tRNA-GCA
trn43	Lys-tRNA-TTT
trn44	Arg-tRNA-CCG
trn45	Ala-tRNA-CGC
trn46	Ala-tRNA-CGC
trn47	Asp-tRNA-GTC
trpS1	tryptophanyl-tRNA synthetase
trpS2	tryptophanyl-tRNA synthetase
truA	pseudouridylate synthase I
tyrS	tyrosyl-tRNA synthetase
valS	valyl-tRNA synthetase

Miscellaneous

aca	probable acetyl-coa acetyltransferase
apa	diadenosine tetraphosphate pyrophosphohydrolase
aph	alkaline phosphatase
appA	oligopeptide binding protein
araL	unknown L-arabinose operon protein
atp	aaa superfamily atpase
bcp	bacterioferritin comigrating protein
bdb	L-2,4-diaminobutyrate decarboxylase
blh	Brp-like homolog
blp	bacterio-opsin linked product
boa1	bacterio-opsin activator-like protein
boa2	bacterio-opsin activator-like protein
boa3	bacterio-opsin activator-like protein
boa4	bacterio-opsin activator-like protein
caaX	zinc metalloproteinase homolog
cad	pterin-4a-carbinolamine dehydratase
cbp	calcium-binding protein homology
ccp	cytochrome aa3 controlling protein
chi	chitinase
comA	competence-like protein
cpcE	phycocyanin alpha phycocyanobilin lyase-like
cxp	probable carboxypeptidase
cyo	cytochrome oxidase subunit I homolog
dbp	DNA binding protein eukaryotic-like
dgs	dolichol-P-glucose transferase
edp	proteinase IV homolog
eye	erythromycin esterase-like
fbr	cytochrome-like protein
folD	methylenetetrahydrofolate dehydrogenase
gbp1	GTP-binding protein homolog
gbp2	GTP-binding protein homolog
gbp3	GTP-binding protein homolog
gbp4	GTP-binding protein homolog
gbp5	GTP-binding protein homolog
gcp	O-sialoglycoprotein endopeptidase homolog
glo1	glyoxalase
gst	galactosyltransferase homolog
gtl	glycosyl transferase-like
gufA	GufA protein
gul1	inosine-5'-monophosphate dehydrogenase-like
gul2	inosine-5'-monophosphate dehydrogenase-like
hal	O-acetyl homoserine
ham1	HAM1 protein homolog
hat1	acetyltransferase homolog
hat2	acetyltransferase homolog
hcpA	halocyanin precursor-like
hcpB	halocyanin precursor-like
hcpC	halocyanin precursor-like
hcpD	halocyanin precursor-like
hdrD	heterodisulfide reductase
hef	hydrogenase expression/formation
hflX1	GTP-binding protein
hflX2	GTP-binding protein
hit1	histidine triad protein
hit2	histidine triad protein
hlp	hemolysin protein
hly	halolysin
hmp	putative membrane protein
hpb	possible phosphate binding protein
htlA	Htr-like protein
htlB	Htr-like protein
htlC	Htr-like protein
htlD	Htr-like protein
icfA	carbonic anhydrase
imp	immunogenic protein
inb	oxidoreductase homolog
IS*H1*	insertion sequence
IS*H2*	insertion sequence (same IRs as IS*H8*)
IS*H3*	insertion sequence family (similar to IS*H27* and IS*H51*)
IS*H4*	insertion sequence
IS*H5*	insertion sequence family
IS*H6*	insertion sequence (similar to IS*HS1*)
IS*H7*	insertion sequence family (similar to IS*H24*)
IS*H8*	insertion sequence family (same IRs as IS*H2*, similar to IS*H26*)
IS*H9*	insertion sequence (similar to IS*H28*)
IS*H10*	insertion sequence
IS*H11*	insertion sequence
IS*H12*	insertion sequence family (similar to IS*H1.8*)
kinA1	signal-transducing histidine kinase homolog
kinA2	signal-transducing histidine kinase homolog
lds	long hypothetical diphthine synthase
lfl1	long-chain fatty-acid-CoA ligase
lfl2	long-chain fatty-acid-CoA ligase
lon	ATP-dependent proteinase homolog
lpl	lipoate protein ligase
lta	l-allo-threonine aldolase
mak	MAPK-activated protein kinase
maoC1	monoamine oxidase regulatory-like
maoC2	monoamine oxidase regulatory-like
mch	N5,N10-methenyltetrahydromethanopterin cyclohydrolase
mer	N5,N10-methylenetetrahydromethanopterin reductase
mrp	Mrp protein homolog
mrr	Mrr restriction system protein homolog
msrA	peptide methionine sulfoxide reductase
nifS	NifS protein, class-V aminotransferase
nodP	nodulation protein
nolA	NADH dehydrogenase/oxidoreductase-like protein
nolB	NADH dehydrogenase/oxidoreductase-like protein
nolC	NADH dehydrogenase/oxidoreductase-like protein
nolD	NADH dehydrogenase/oxidoreductase-like protein
npa	neutral proteinase
ntp	neutral proteinase
oxrA	putative oxidoreductase
panB	ketopantoate hydroxymethyltransferase-like
pcy	plastocyanin homology
pchA	potassium channel homolog
pchB	potassium channel homolog
pepB1	aminopeptidase homolog
pepB2	aminopeptidase homolog
pepB3	aminopeptidase homolog
pepQ1	probable peptidase
pepQ2	probable peptidase
pgp	phosphoglycolate phosphatase
phnE	transport protein
phnP	ATP-binding protein
phzF	phenazine biosynthetic enzyme
pmu1	phosphomannomutase
pmu2	phosphomannomutase
pnm	N-methyltransferase homolog
ppd	3-isopropylmalate dehydratase
ppe	phosphoesterase
prkA	protein kinase
prp2	phosphate regulatory protein homolog
prrIV1	ATP-dependent 26S proteinase regulatory subunit 4 homolog
prrIV2	ATP-dependent 26S proteinase regulatory subunit 4 homolog
psc	3-phosphoshikimate 1-carboxyvinyltransferase
ptp	probable transport protein
rli	RNase L inhibitor homolog
scm	24-sterol C-methyltransferase
sdh	succinate dehydrogenase complex protein
sdhD	succinate dehydrogenase membrane anchor homolog
slyD	peptidyl-prolyl cis-trans isomerase
spoVR	spore cortex synthesis protein
sub	subtilisin homolog
suhB	extragenic suppressor homolog
taqD	glycerol-3-phosphate cytidyltransferase
thb	thiamin-binding periplasmic protein precursor homolog
tnp	putative transposase
tot	transmembrane oligosaccharyl transferase homolog
tpc	RNA 3'-terminal phosphate cyclase
traB	possible signaling protein
trh	thioredoxin reductase-like protein
tssA	probable thiosulfate sulfurtransferase
tssB	thiosulfate sulfurtransferase
uae	UDP-N-acetylglucosamine 2-epimerase
yajO1	probable oxidoreductase
yajO2	probable oxidoreductase
yuiH	sulfite oxidase homolog
yuxL	acylaminoacyl-peptidase
yvbT	alkanal monooxygenase homolog
yvoF	acetyltransferase homolog
ywaD	aminopeptidase
yyaI	acetyltransferase homolog