Table 2: List of phylogntically useful genes (PUG)

PA Number	Gene	Alt gene	Functional Annotation	Functional Category	Parsimony-Informative Sites
PA2002	*atoE*		conserved hypothetical protein	b	4
PA4372			hypothetical protein	b	4
PA5386			probable 3-hydroxyacyl-CoA dehydrogenase	b	4
PA1164			conserved hypothetical protein	c	4
PA1421	*gbuA*	*speB2*	guanidinobutyrase	e	4
PA3792	*leuA*		2-isopropylmalate synthase	e	4
PA1475	*ccmA*	*helA/cycV*	heme exporter protein CcmA	h	4
PA2408		*znuC*	probable ATP-binding component of ABC transporter	h	4
PA2711	*potF4*		probable periplasmic spermidine/putrescine-binding protein	h	4
PA0130		*mmsA*	probable aldehyde dehydrogenase	i	4
PA0773	*pdxJ*		pyridoxal phosphate biosynthetic protein PdxJ	j	4
PA3625	*surE*		survival protein SurE	k	4
PA3548	*algI*		alginate o-acetyltransferase AlgI	n	4
PA4956	*rhdA*		thiosulfate:cyanide sulfurtransferase	q	4
PA1524	*xdhA*		xanthine dehydrogenase	r	4
PA4720	*trmA*		tRNA (uracil-5-)-methyltransferase	zB	4
PA4693	*pssA*		phosphatidylserine synthase	b	5
PA3897			hypothetical protein	d	5
PA1162	*dapE*		succinyl-diaminopimelate desuccinylase	e	5
PA3666	*dapD*		tetrahydrodipicolinate succinylase	e	5
PA3814	*iscS*		L-cysteine desulfurase (pyridoxal phosphate-dependent)	e	5
PA1651			probable transporter	h	5
PA2341	*mtlK*		probable ATP-binding component of ABC maltose/mannitol transporter	h	5
PA5095		*proW*	probable permease of ABC transporter	h	5
PA4438		*yhcM*	conserved hypothetical protein	i	5
PA2826			probable glutathione peroxidase	k	5
PA2843			probable aldolase	o	5
PA1687	*speE*		spermidine synthase	q	5
PA5260	*hemC*	*popE*	porphobilinogen deaminase	q	5
PA0441	*dht*	*hyuA*	dihydropyrimidinase	r	5
PA0590	*apaH*		bis(5'-nucleosyl)-tetraphosphatase	r	5
PA3751	*purT*		phosphoribosylglycinamide formyltransferase 2	r	5
PA5387			conserved hypothetical protein	c	6
PA0229	*pcaT*	*kgtP*	dicarboxylic acid transporter PcaT	d	6
PA0392		*yggT*	conserved hypothetical protein	d	6
PA0440	*dypA*		probable oxidoreductase	e	6
PA3108	*purF*		amidophosphoribosyltransferase	e	6
PA5373	*betB*		betaine aldehyde dehydrogenase	e	6
PA5451	*wzm*		membrane subunit of A-band LPS efflux transporter	g	6
PA0301	*spuE*	*potF3*	polyamine transport protein	h	6

PA1207	*kefB*	*trkB/kefC*	glutathione-regulated potassium-efflux system protein KefB	h	6
PA3865		*hisJ*	probable amino acid binding protein	h	6
PA5479	*gltP*		proton-glutamate symporter	h	6
PA2776	*ordL*		conserved hypothetical protein	i	6
PA0182		*yjgI*	probable short-chain dehydrogenase	j	6
PA4606	*cstA*		conserved hypothetical protein	k	6
PA3970	*amn*		AMP nucleosidase	r	6
PA0211	*mdcD*		malonate decarboxylase beta subunit	s	6
PA5028			conserved hypothetical protein	y	6
PA2545	*xthA*		exodeoxyribonuclease III	a	7
PA1640			conserved hypothetical protein	b	7
PA2001	*atoB*		acetyl-CoA acetyltransferase	b	7
PA0240	*opdF*		probable porin	d	7
PA2751		*yfkH*	conserved hypothetical protein	d	7
PA5172	*arcB*		ornithine carbamoyltransferase, catabolic	e	7
PA2278	*arsB*		ArsB protein	h	7
PA3920		*yvgX*	probable metal transporting P-type ATPase	h	7
PA1318	*cyoB*		cytochrome o ubiquinol oxidase subunit I	i	7
PA5192	*pckA*		phosphoenolpyruvate carboxykinase	i	7
PA0500	*bioB*		biotin synthase	j	7
PA2611	*cysG*		siroheme synthase	j	7
PA0181		*yeaT*	probable transcriptional regulator	l	7
PA4367			conserved hypothetical protein	m	7
PA2823			conserved hypothetical protein	o	7
PA4974	*opmH*		probable outer membrane protein precursor	x	7
PA1528	*zipA*		cell division protein ZipA	y	7
PA3617	*recA*		RecA protein	a	8
PA3164			still frameshift 3-PHOSPHOSHIKIMATE 1-CARBOXYVINYLTRANSFERASE prephenate dehydrogenase	e	8
PA4696	*ilvI*		acetolactate synthase large subunit	e	8
PA3047	*dacB*	*pbp*	probable D-alanyl-D-alanine carboxypeptidase	g	8
PA3186	*oprB*		Glucose/carbohydrate outer membrane porin OprB precursor	h	8
PA2623	*icdA*		isocitrate dehydrogenase	i	8
PA5034	*hemE*		uroporphyrinogen decarboxylase	j	8
PA4184			probable transcriptional regulator	l	8
PA5550	*glmR*		GlmR transcriptional regulator	l	8
PA3828		*yjgP*	conserved hypothetical protein	d	9
PA4370	*icmP*		Insulin-cleaving metalloproteinase outer membrane protein precursor	d	9
PA2249	*bkdB*		branched-chain alpha-keto acid dehydrogenase (lipoamide component)	e	9
PA2309			hypothetical protein	h	9
PA2250	*lpdV*		lipoamide dehydrogenase-Val	i	9
PA4470	*fumC1*		fumarate hydratase	i	9
PA2903	*cobJ*	*cbiH*	precorrin-3 methylase CobJ	j	9

PA5237		*yigC*	conserved hypothetical protein	j	9
PA4398			probable two-component sensor	m	9
PA2494	*mexF*		Resistance-Nodulation-Cell Division (RND) multidrug efflux transporter MexF	zA	9
PA2840	*deaD*		probable ATP-dependent RNA helicase	zB	9
PA0507		fad?	probable acyl-CoA dehydrogenase	b	10
PA5546			conserved hypothetical protein	b	10
PA3424			hypothetical protein	e	10
PA3624	*pcm*		L-isoaspartate protein carboxylmethyltransferase type II	f	10
PA3824	*queA*		S-adenosylmethionine:trna ribosyltransferase-isomerase	f	10
PA0185	*atsB*		probable permease of ABC transporter	h	10
PA0281	*cysW*		sulfate transport protein CysW	h	10
PA3677			probable Resistance-Nodulation-Cell Division (RND) efflux membrane fusion protein precursor	h	10
PA2867			probable chemotaxis transducer	u	10
PA1730			conserved hypothetical protein	c	11
PA1566			conserved hypothetical protein	e	11
PA4548	*dadA*	*yfiT*	probable D-amino acid oxidase	e	11
PA4344			probable hydrolase	f	11
PA0464	*creC*	*phoM*	two-component sensor CreC	m	11
PA2346			conserved hypothetical protein	o	11
PA3769	*guaA*		GMP synthase	r	11
PA4701			conserved hypothetical protein	c	12
PA1638		*yneH*	conserved hypothetical protein	e	12
PA5235	*glpT*		glycerol-3-phosphate transporter	h	12
PA4733	*acsB*		acetyl-coenzyme A synthetase	q	12
PA3950			probable ATP-dependent RNA helicase	zB	12
PA5443	*uvrD*	*recL/rad/pdeB/ mutU*	DNA helicase II	a	13
PA0454		*yccS*	conserved hypothetical protein	d	13
PA3257	*prc*	*tsp*	periplasmic tail-specific protease	f	13
PA1946	*rbsB*		binding protein component precursor of ABC ribose transporter	h	13
PA3896			probable 2-hydroxyacid dehydrogenase	i	13
PA0757		*tctE*	probable two-component sensor	m	13
PA3710			probable GMC-type oxidoreductase	o	13
PA1101	*fliF*		Flagella M-ring outer membrane protein precursor	t	13
PA1886	*polB*	*dinA*	DNA polymerase II	a	14
PA1689			conserved hypothetical protein	d	14
PA1272	*cobO*	*cobA/btuR*	cob(I)alamin adenosyltransferase	j	14
PA3821	*secD*		secretion protein SecD	x	14
PA4483	*gatA*		Glu-tRNA(Gln) amidotransferase subunit A	f	15
PA3759			probable aminotransferase	g	15
PA3028	*moeA2*		molybdenum cofactor biosynthesis protein A2	j	15
PA4692			conserved hypothetical protein	o	15
PA3271		*flhS*	probable two-component sensor	m	16
PA0559		*yhiN*	conserved hypothetical protein	d	17

PA5529			probable sodium/proton antiporter	h	17
PA1585	*sucA*		2-oxoglutarate dehydrogenase (E1 subunit)	i	17
PA4843			probable two-component response regulator	m	17
PA0183	*atsA*		arylsulfatase	q	17
PA1532	*dnaX*		DNA polymerase subunits gamma and tau	a	18
PA4115		*ygdH*	conserved hypothetical protein	o	21
PA3893			conserved hypothetical protein	x	22
PA2018	*mexH*	*amrB/mexY*	Resistance-Nodulation-Cell Division (RND) multidrug efflux transporter	zA	23
PA5447	*wbpZ*		glycosyltransferase WbpZ	g	25
PA3297	*hrpA*		probable ATP-dependent helicase	a	26
PA4686			hypothetical protein	c	26
PA4772			probable ferredoxin	i	27
PA4513	*piuB*		probable oxidoreductase	o	29
PA3961	*hrpB*		probable ATP-dependent helicase	a	30
PA3258			hypothetical protein	o	31
PA5556	*atpA*	*papA/uncA*	ATP synthase alpha chain	i	55
PA2393			probable dipeptidase precursor	q	118
PA2403			hypothetical protein	d	138
PA0595	*ostA*	*imp*	organic solvent tolerance protein OstA precursor	k	376