

Table S4. Genes expressed at significantly higher levels in the flea by wild-type *Y. pestis* CO92 than by the *Y. pseudotuberculosis* mutant (IPmt strain)

Gene ID ^a	Gene name	Predicted gene function	Relative expression
1 day after infection:			
YPTB0110	YPO3927	<i>argC</i> N-acetyl-gamma-glutamyl-phosphate reductase	2.6
YPTB0145	YPO3888	<i>ilvC</i> ketol-acid reductoisomerase	2.9
YPTB0196	YPO3839	-- hypothetical protein	7.5
YPTB0197	YPO3838	-- hypothetical protein	4.6
YPTB0247	YPO3789	<i>metR</i> LysR family transcriptional regulator	2.0
YPTB0248	YPO3788	<i>metE</i> 5-methyltetrahydropteroyltriglutamate--homocysteine S-methyltransferase	3.5
YPTB0267	YPO3766	<i>fadB</i> fatty acid oxidation complex subunit alpha	2.1
YPTB0275	YPO3757	-- N-acetyltransferase	2.7
YPTB0342	YPO0284	-- hypothetical protein	3.9
YPTB0343	YPO0285	-- heme utilization carrier protein	4.4
YPTB0344	YPO0286	-- putative heme utilization radical SAM enzyme	3.6
YPTB0458	YPO3518	-- hypothetical protein	3.0
YPTB0483	YPO3493	<i>rpsO</i> 30S ribosomal protein S15	2.3
YPTB0526	YPO3446	<i>argI</i> ornithine carbamoyltransferase subunit I	2.1
YPTB0547	YPO0407	<i>lsrG</i> autoinducer-2 (AI-2) modifying protein	6.4
YPTB0548	YPO0408	<i>lsrF</i> AI-2 aldolase	6.3
YPTB0549	YPO0409	<i>lsrB</i> AI-2 ABC transporter substrate-binding protein	6.2
YPTB0550	YPO0410	<i>lsrD</i> AI-2 import system permease	5.4
YPTB0551	YPO0411	<i>lsrC</i> AI-2 import system permease	15.4
YPTB0552	YPO0412	<i>lsrA</i> AI-2 import ATP-binding protein	19.2
YPTB0554	YPO0415	<i>lsrK</i> AI-2 kinase	6.0
YPTB0556	YPO0417	-- O-antigen biosynthesis protein	2.0
YPTB0571	YPO0426	-- hypothetical protein	2.9
YPTB0883	YPO3244	<i>fadE</i> acyl-CoA dehydrogenase	2.3
YPTB1051	YPO2807	-- LysR family transcriptional regulator	3.5
YPTB1143	YPO1109	<i>sdhC</i> succinate dehydrogenase cytochrome b556 large membrane subunit	2.2
YPTB1169	YPO1137	<i>galK</i> galactokinase	2.0
YPTB1170	YPO1138	<i>galT</i> galactose-1-phosphate uridylyltransferase	4.2
YPTB1274	YPO1239	-- bacteriophage protein	2.5
YPTB1276	YPO1241	-- bacteriophage protein	2.2
YPTB1277	YPO1242	-- bacteriophage tail sheath protein	2.3
YPTB1278	YPO1243	-- phage tail protein	2.2
YPTB1279	YPO1244	-- bacteriophage protein	2.2
YPTB1283	YPO1248	-- bacteriophage (baseplate assembly) protein	2.5
YPTB1284	YPO1249	-- bacteriophage protein GP46	2.3

YPTB1299	YPO1264	<i>rplY</i>	50S ribosomal protein L25	2.7
YPTB1352	YPO1321	<i>sdaC</i>	serine/threonine transporter	9.1
YPTB1411	YPO1386	<i>ansB</i>	L-asparaginase II	2.4
YPTB1524	YPO1509	<i>mgIC</i>	galactoside ABC transporter permease	2.1
YPTB1540	YPO1528	<i>ysuF</i>	hydroxamate siderophore iron reductase	2.0
YPTB1579	YPO1570	<i>argG</i>	argininosuccinate synthase	3.4
YPTB1591	YPO1906	<i>fyuA</i>	TonB-dependent pesticin/yersiniabactin receptor	20.6
YPTB1592	YPO1907	<i>ybtE</i>	yersiniabactin siderophore biosynthetic protein	5.9
YPTB1593	YPO1908	<i>ybtT</i>	yersiniabactin biosynthetic protein	6.5
YPTB1595	YPO1910	<i>irp1</i>	yersiniabactin biosynthetic protein	4.5
YPTB1596	YPO1911	<i>irp2</i>	yersiniabactin biosynthetic protein	2.8
YPTB1599	YPO1914	<i>ybtQ</i>	inner membrane ABC-transporter	7.4
YPTB1600	YPO1915	<i>ybtX</i>	MFS superfamily transporter signal transducer	10.1
YPTB1601	YPO1916	<i>ybtS</i>	salicylate synthase Irp9	6.7
YPTB1624	YPO1746	<i>cspC</i>	cold shock-like protein	2.5
YPTB1636	YPO1760	<i>hpaR</i>	homoprotocatechuate degradative operon repressor	3.9
YPTB1640	YPO1764	<i>hpaD</i>	3,4-dihydroxyphenylacetate 2,3-dioxygenase	3.2
YPTB1642	YPO1766	<i>hpaH</i>	2-oxo-hept-3-ene-1,7-dioate hydratase	2.8
YPTB1934	YPO1936	--	aminotransferase	3.1
YPTB1949	YPO1951	<i>hmsH</i>	poly-beta-1,6 N-acetyl-D-glucosamine export porin	6.7
YPTB1950	YPO1952	<i>hmsF</i>	poly-beta-1,6-N-acetyl-D-glucosamine N-deacetylase	6.5
YPTB1951	YPO1953	<i>hmsR</i>	poly-beta-1,6 N-acetyl-D-glucosamine synthase	7.8
YPTB1952	YPO1954	<i>hmsS</i>	poly-beta-1,6-N-acetyl-D-glucosamine biosynthesis	12.1
YPTB1956	YPO1958	<i>chaA</i>	calcium/sodium:proton antiporter	2.0
YPTB2019	YPO2037	--	hydrolase	2.1
YPTB2363	YPO1718	--	oligogalacturonate specific porin	7.9
YPTB2500	YPO2457	<i>ypsR</i>	quorum-sensing transcriptional activator YpeR	3.1
YPTB2527	YPO2486	--	hemolysin /hemagglutinin	4.5
YPTB2554	YPO2521	--	hypothetical protein	3.4
YPTB2600	YPO2569	--	PTS ascorbate transporter subunit IIA	2.6
YPTB2636	YPO2747	<i>fadJ</i>	fatty acid oxidation complex subunit alpha	2.3
YPTB2697	YPO2974	--	B-type cytochrome	2.5
YPTB2698	YPO2975	--	aminotransferase	6.2
YPTB2835	YPO2873	--	hypothetical protein	3.3
YPTB2866	YPO2904	<i>hcaT</i>	3-phenylpropionic acid transporter	3.6
YPTB2867	YPO2905	<i>ail</i>	attachment invasion locus protein	3.6
YPTB2956	YPO2650	<i>nrdI</i>	ribonucleotide reductase stimulatory protein	2.3
YPTB3108	YPO0864	--	hypothetical protein	2.1
YPTB3203	YPO0931	<i>metK</i>	S-adenosylmethionine synthetase	2.1
YPTB3230	YPO0958	<i>mgIA</i>	sugar ABC transporter ATPase	2.5
YPTB3231	YPO0959	--	sugar ABC transporter periplasmic binding protein	3.5
YPTB3262	YPO0988	--	major facilitator superfamily efflux protein	8.9
YPTB3316	YPO0749	--	hypothetical protein	2.3

YPTB3382	YPO0683	--	biopolymer transport protein ExbD	2.2
YPTB3421	YPO0640	--	hypothetical protein	10.7
YPTB3427	YPO0628	--	enamine deaminase RidA translational inhibitor protein	32.5
YPTB3428	YPO0627	--	RidA family translational inhibitor protein	17.3
YPTB3429	YPO0626	--	YheO-like PAS domain protein	12.9
YPTB3430	YPO0625	--	polyketide cyclase	36.7
YPTB3431	YPO0624	--	NhaC family Na ⁺ /H ⁺ antiporter	45.6
YPTB3432	YPO0623	--	aminotransferase	26.3
YPTB3433	YPO0622	--	hypothetical protein	2.2
YPTB3534	YPO3699	--	hypothetical protein	6.4
YPTB3535	YPO3698	<i>treR</i>	trehalose repressor	4.7
YPTB3538	YPO3695	<i>rnk</i>	nucleoside diphosphate kinase regulator	2.9
YPTB3550	YPO3682	<i>yitR</i>	transcriptional regulator of insecticidal-like toxin genes	6.5
YPTB3578	YPO3652	--	hypothetical protein	3.4
YPTB3579	YPO3651	--	GntR family transcriptional regulator	3.8
YPTB3580	YPO3650	--	major facilitator superfamily metabolite symporter	9.8
YPTB3581	YPO3649	--	gamma carboxymuconolactone decarboxylase	32.7
YPTB3582	YPO3648	--	2-hydroxy-3-oxopropionate reductase	4.4
YPTB3583	YPO3647	--	MBL fold hydrolase	3.4
YPTB3597	YPO3632	<i>ddg</i>	lipid A biosynthesis palmitoleoyl acyltransferase	2.0
YPTB3641	YPO3710	<i>malM</i>	maltose regulon periplasmic protein	2.9
YPTB3642	YPO3711	<i>lamB</i>	maltoporin	5.3
YPTB3643	YPO3712	<i>malk</i>	maltose/maltodextrin transporter ATP-binding protein	4.0
YPTB3645	YPO3714	<i>malE</i>	maltose ABC transporter periplasmic protein	2.9
YPTB3647	YPO3716	<i>malG</i>	maltose transporter permease	2.4
YPTB3655	YPO3724	<i>aceK</i>	isocitrate dehydrogenase kinase/phosphatase protein	9.9
YPTB3656	YPO3725	<i>aceA</i>	isocitrate lyase	17.5
YPTB3657	YPO3726	<i>aceB</i>	malate synthase	13.3
YPTB3658	YPO3727	<i>metA</i>	homoserine O-succinyltransferase	5.2
YPTB3701	YPO0205	<i>bfd</i>	bacterioferritin-associated ferredoxin	2.2
YPTB3753	YPO0148	--	hypothetical protein	4.0
YPTB3805	YPO3962	--	ABC transporter, periplasmic ribose binding protein	2.1
YPTB3934	YPO4050	--	hypothetical protein	4.2
14 days after infection:				
YPTB0119	YPO3916	--	peroxiredoxin/glutaredoxin family protein	2.4
YPTB0145	YPO3888	<i>ilvC</i>	ketol-acid reductoisomerase	3.4
YPTB0196	YPO3839	--	hypothetical protein	9.3
YPTB0275	YPO3757	--	acetyltransferase	2.2
YPTB0340	YPO0283	<i>hmuR</i>	tonB dependent outer membrane hemin receptor	2.4
YPTB0342	YPO0284	--	hypothetical protein	3.7
YPTB0344	YPO0286	--	coproporphyrinogen III oxidase	7.7
YPTB0370	YPO0314	<i>lexA</i>	LexA repressor	2.5
YPTB0379	YPO0324	<i>uvrA</i>	excinuclease ABC subunit A	2.6

YPTB0494	YPO3480	--	U32 family peptidase	2.2
YPTB0547	YPO0407	<i>lsrG</i>	autoinducer-2 (AI-2) modifying protein	10.1
YPTB0548	YPO0408	<i>lsrF</i>	AI-2 aldolase	10.6
YPTB0549	YPO0409	<i>lsrB</i>	AI-2 ABC transporter substrate-binding protein	11.7
YPTB0550	YPO0410	<i>lsrD</i>	AI-2 import system permease	7.0
YPTB0551	YPO0411	<i>lsrC</i>	AI-2 import system permease	15.2
YPTB0552	YPO0412	<i>lsrA</i>	AI-2 import ATP-binding protein	12.6
YPTB0554	YPO0415	<i>lsrK</i>	AI-2 kinase	6.7
YPTB0556	YPO0417	--	O-antigen biosynthesis protein	2.5
YPTB0568	YPO0423	--	hypothetical protein	2.0
YPTB0571	YPO0426	--	hypothetical protein	2.5
YPTB0592	YPO0449	<i>hmsD</i>	diguanylate cyclase	2.4
YPTB0623	YPO0481	<i>carA</i>	carbamoyl phosphate synthase small subunit	2.6
YPTB0625	YPO0483	--	lysine transporter LysE-type	2.7
YPTB0750	YPO3381	<i>barA</i>	hybrid sensory histidine kinase	2.5
YPTB0823	YPO3307	<i>recA</i>	recombinase A	2.4
YPTB0866	YPO3257	--	amino acid ABC transporter, periplasmic protein	2.1
YPTB0867	YPO3256	--	amino acid ABC transporter, permease protein	2.3
YPTB0868	YPO3255	--	amino acid ABC transporter, permease protein	5.0
YPTB0883	YPO3244	<i>fadE</i>	acyl-CoA dehydrogenase	2.2
YPTB1036	YPO2825	--	ribosome-associated protein	2.3
YPTB1138	YPO1104	--	outer membrane protein assembly factor BamE	2.1
YPTB1139	YPO1105	<i>recN</i>	recombination and repair protein	2.2
YPTB1144	YPO1110	<i>sdhD</i>	succinate dehydrogenase cytochrome b556 small membrane subunit	2.3
YPTB1145	YPO1111	<i>sdhA</i>	succinate dehydrogenase flavoprotein subunit	2.1
YPTB1170	YPO1138	<i>galT</i>	galactose-1-phosphate uridylyltransferase	2.0
YPTB1198	YPO1168	<i>betT</i>	choline transport protein	3.4
YPTB1227	YPO1186	--	hypothetical protein	2.5
YPTB1269	YPO1234	--	phage antitermination protein Q	3.3
YPTB1274	YPO1239	--	bacteriophage protein	2.7
YPTB1276	YPO1241	--	bacteriophage protein	2.5
YPTB1277	YPO1242	--	bacteriophage tail sheath protein	5.0
YPTB1278	YPO1243	--	hypothetical protein	4.6
YPTB1279	YPO1244	--	bacteriophage protein	7.3
YPTB1281	YPO1246	--	bacteriophage protein	3.0
YPTB1282	YPO1247	--	bacteriophage tail protein	12.4
YPTB1284	YPO1249	--	bacteriophage protein GP46	4.5
YPTB1299	YPO1264	<i>rplY</i>	50S ribosomal protein L25	3.2
YPTB1341	YPO1310	--	ABC type periplasmic iron siderophore/cobalamin binding protein	2.6
YPTB1352	YPO1321	<i>sdaC</i>	HAAAP family serine/H(+) symporter	7.0
YPTB1389	YPO1363	--	virulence factor	2.6

YPTB1408	YPO1383	<i>pflB</i>	formate acetyltransferase 1	2.2
YPTB1409	YPO1384	<i>focA</i>	formate transporter	2.1
YPTB1454	YPO1436	<i>sulA</i>	SOS cell division inhibitor	3.4
YPTB1540	YPO1528	<i>ysuF</i>	hydroxamate siderophore iron reductase	3.7
YPTB1591	YPO1906	<i>fyuA</i>	OMR family pesticin/yersiniabactin receptor protein	11.8
YPTB1592	YPO1907	<i>ybtE</i>	yersiniabactin siderophore biosynthetic protein	2.8
YPTB1593	YPO1908	<i>ybtT</i>	yersiniabactin biosynthetic protein YbtT	4.1
YPTB1594	YPO1909	<i>ybtU</i>	yersiniabactin biosynthetic protein YbtU	7.6
YPTB1595	YPO1910	<i>irp1</i>	yersiniabactin biosynthetic protein	3.2
YPTB1597	YPO1912	<i>ybtA</i>	transcriptional regulator YbtA	5.0
YPTB1598	YPO1913	<i>ybtP</i>	lipoprotein inner membrane ABC-transporter	6.0
YPTB1600	YPO1915	<i>ybtX</i>	MFS superfamily transporter signal transducer	2.6
YPTB1601	YPO1916	<i>ybtS</i>	salicylate synthase Irp9	3.3
YPTB1636	YPO1760	<i>hpaR</i>	homoprotocatechuate degradative operon repressor	4.2
YPTB1640	YPO1764	<i>hpaD</i>	3,4-dihydroxyphenylacetate 2,3-dioxygenase	2.4
YPTB1642	YPO1766	<i>hpaH</i>	2-oxo-hept-3-ene-1,7-dioate hydratase	2.8
YPTB1643	YPO1767	<i>hpaI</i>	2,4-dihydroxyhept-2-ene-1,7-dioic acid aldolase	2.7
YPTB1721	YPO1849	--	transcriptional regulator	5.4
YPTB1722	YPO1850	--	hypothetical protein	6.8
YPTB1934	YPO1936	--	aminotransferase	3.8
YPTB1939	YPO1941	--	high-affinity Fe ²⁺ /Pb ²⁺ permease	2.3
YPTB1940	YPO1942	--	iron transporter	2.2
YPTB1941	YPO1943	--	hypothetical protein	2.4
YPTB1949	YPO1951	<i>hmsH</i>	poly-beta-1,6 N-acetyl-D-glucosamine export porin	8.3
YPTB1950	YPO1952	<i>hmsF</i>	poly-beta-1,6-N-acetyl-D-glucosamine N-deacetylase	6.3
YPTB1951	YPO1953	<i>hmsR</i>	poly-beta-1,6 N-acetyl-D-glucosamine synthase	8.6
YPTB1952	YPO1954	<i>hmsS</i>	poly-beta-1,6-N-acetyl-D-glucosamine biosynthesis	9.6
YPTB2019	YPO2037	--	hydrolase	3.1
YPTB2020	YPO2038	--	molecular chaperone	2.1
YPTB2117	YPO2193	<i>tonB</i>	transport protein TonB	2.0
YPTB2363	YPO1718	--	oligogalacturonate specific porin	7.1
YPTB2411	YPO1660	<i>mgtC1</i>	magnesium ABC transporter ATPase	2.3
YPTB2437	YPO1631	<i>pepT</i>	peptidase T	3.0
YPTB2485	YPO2448	<i>solA</i>	N-methyltryptophan oxidase	2.1
YPTB2500	YPO2457	<i>ypsR</i>	quorum-sensing transcriptional activator YpeR	3.7
YPTB2591	YPO2560	--	hypothetical protein	3.6
YPTB2596	YPO2565	--	hypothetical protein	2.4
YPTB2697	YPO2974	--	B-type cytochrome	2.8
YPTB2698	YPO2975	--	aminotransferase	4.7
YPTB2835	YPO2873	--	hypothetical protein	3.9
YPTB2866	YPO2904	<i>hcaT</i>	3-phenylpropionic acid transporter	7.4
YPTB2867	YPO2905	<i>ail</i>	attachment invasion locus protein	4.2

YPTB2949	YPO2660	--	ABC transporter, periplasmic nickel/di-oligopeptide binding protein	2.1
YPTB2953	YPO2653	--	hypothetical protein	2.2
YPTB2959	YPO2647	<i>proV</i>	ABC glycine/betaine/L-proline transporter, ATP-binding subunit	3.2
YPTB2960	YPO2646	<i>proW</i>	glycine betaine transporter membrane protein	4.1
YPTB2961	YPO2645	<i>proX</i>	glycine betaine transporter periplasmic subunit	3.3
YPTB3108	YPO0864	--	PadR family transcriptional regulator	2.4
YPTB3262	YPO0988	--	major facilitator superfamily efflux protein	3.8
YPTB3330	YPO0733	<i>flgL</i>	flagellar hook-associated protein FlgL	2.0
YPTB3335	YPO0728	<i>flgG</i>	flagellar basal body rod protein FlgG	2.9
YPTB3382	YPO0683	--	biopolymer transport protein ExbD	2.7
YPTB3396	YPO0667	--	esterase YqiA	2.1
YPTB3420	YPO0641	--	hypothetical protein	8.4
YPTB3421	YPO0640	--	hypothetical protein	10.9
YPTB3427	YPO0628	--	translational inhibitor protein	16.2
YPTB3428	YPO0627	--	translational inhibitor protein	15.7
YPTB3429	YPO0626	--	histidine kinase	11.9
YPTB3430	YPO0625	--	polyketide cyclase	22.4
YPTB3431	YPO0624	--	NhaC family Na ⁺ /H ⁺ antiporter	25.8
YPTB3432	YPO0623	--	aminotransferase	18.7
YPTB3504	YPO3559	--	hypothetical protein	2.1
YPTB3534	YPO3699	--	hypothetical protein	4.2
YPTB3535	YPO3698	<i>treR</i>	trehalose repressor	5.4
YPTB3550	YPO3682	<i>yitR</i>	transcriptional regulator of insecticidal-like toxin genes	6.8
YPTB3578	YPO3652	--	hypothetical protein	6.6
YPTB3579	YPO3651	--	GntR family transcriptional regulator	8.6
YPTB3580	YPO3650	--	major facilitator superfamily metabolite symporter	13.4
YPTB3581	YPO3649	--	gamma carboxymuconolactone decarboxylase	20.6
YPTB3582	YPO3648	--	2-hydroxy-3-oxopropionate reductase	5.3
YPTB3583	YPO3647	--	MBL fold hydrolase	4.2
YPTB3585	YPO3643	<i>cspa1</i>	major cold shock protein Cspa1	3.7
YPTB3643	YPO3712	<i>malk</i>	maltose/maltodextrin transporter ATP-binding protein	2.8
YPTB3655	YPO3724	<i>aceK</i>	isocitrate dehydrogenase kinase/phosphatase protein	9.3
YPTB3656	YPO3725	<i>aceA</i>	isocitrate lyase	5.1
YPTB3657	YPO3726	<i>aceB</i>	malate synthase	7.7
YPTB3701	YPO0205	<i>bfd</i>	bacterioferritin-associated ferredoxin	4.3
YPTB3753	YPO0148	--	hypothetical protein	2.6
YPTB3754	YPO0147	--	pilus assembly protein PilN	2.1
YPTB3755	YPO0146	--	pilus assembly protein HofM	2.1
YPTB3768	YPO0132	<i>feoB</i>	ferrous iron transport protein B	4.1
YPTB3769	YPO0131	--	ferrous iron transporter C CDS	2.0
YPTB3810	YPO3967	<i>pitA</i>	inorganic phosphate transporter	2.6

YPTB3825	YPO3985	--	inner membrane protein YhjD	4.8
YPTB3909	YPO4080	<i>malS</i>	periplasmic alpha-amylase precursor	2.4
YPTB3934	YPO4050	--	hypothetical protein	4.7

^a Annotation numbers of the *Y. pseudotuberculosis* IP32953 (YPTB) and *Y. pestis* CO92 (YPO) homologs
Criteria: ≥ 2 -fold difference; p -value ≤ 0.01 ; $\geq 98\%$ nucleotide sequence identity between the homologs