

Table S1. Disrupted *M. arthritidis* genes

ORF	Gene	Product	Mp ortholog <sup>a</sup>	Mg ortholog <sup>b</sup>	Disrupted in Mp, Mg <sup>c</sup>	Essential in Bs <sup>c</sup>
006		TatD-related DNase	MYPUP_0140	MG009	yes, yes	
007	<i>ksgA</i>	Dimethyladenosine transferase	MYPUP_0150	MG463	yes, yes	
012	<i>rluC</i>	RNA pseudouridylate synthase C protein	MYPUP_1170	MG209	yes, no	
019 <sup>d</sup>	<i>oppF/vals</i>	Oligopeptide ABC transporter/Valyl-tRNA synthetase	MYPUP_2860	MG080	yes/no, no/no	
023	<i>argE</i>	Acetylornithine deacetylase/Succinyl-diaminopimelate desuccinylase	NA	NA	NA	
032		Hypothetical protein	NA	NA	NA	
036	<i>mam</i>	Superantigen MAM	NA	NA	NA	
037	<i>clpA</i>	ATP-dependent protease	NA	MG355	NA, yes	
057	<i>mspA</i>	Massive surface protein	NA	NA	NA	
064		Lipoprotein	NA	NA	NA	
065		Conserved lipoprotein	MYPUP_6060	NA	yes, NA	
068		Hypothetical protein	NA	NA	NA	
069		Hypothetical protein	NA	NA	NA	
070		Hypothetical protein	NA	NA	NA	
072		Conserved lipoprotein	MYPUP_6070	NA	yes, NA	
074		Lipoprotein	NA	NA	NA	
075	<i>mnuA</i>	Membrane nuclease A, lipoprotein	MYPUP_6930	NA	yes, NA	
079		Conserved hypothetical protein, possible DNA alkylation repair enzyme	NA	NA	NA	
080		Lipoprotein	NA	NA	NA	
085		MAA2-related membrane protein	NA	NA	NA	
103		Phosphonate ABC transporter, permease protein (P69)	MYPUP_2180	MG291	yes, yes	
104		Phosphonate ABC transporter, substrate binding protein (P37)	MYPUP_2250	MG289	no, yes	
106		Hypothetical protein	NA	NA	NA	
109	<i>ldh</i>	Lactate dehydrogenase	MYPUP_7590	MG460	no, yes	
113	<i>gidB</i>	Glucose-inhibited division protein, GidB	MYPUP_1280	MG380	yes, yes	
121		Nitroreductase family protein	NA	NA	NA	
125		<i>M. hominis</i> P60-related lipoprotein	MYPUP_0070	NA	no, NA	
131	<i>spoU</i>	RNA methyltransferase TrmA family (see ORF 754)	MYPUP_1780	MG252	no, yes	
133		Hypothetical protein	NA	NA	NA	
137		Conserved hypothetical protein	NA	NA	NA	
142		Membrane protein	NA	NA	NA	
150	<i>mspI</i>	Massive surface protein	NA	NA	NA	
156		Hypothetical protein	NA	NA	NA	

163		Putative SAM-dependent methyltransferase	MYPU_0540	MG056	no, yes	
168		Conserved hypothetical protein	NA	MG432	NA, no	
169	<i>yehF</i>	GTP-binding protein YchF (putative GTPase translation factor)	MYPU_1650	MG024	no, yes	
172		Hypothetical metal-dependent hydrolase	MYPU_3260	NA	yes, NA	
179	<i>recA</i>	DNA recombination protein A	MYPU_2520	MG339	yes, yes	
186	<i>dinB</i>	Pol_IV_kappa DNA polymerase (DNA polymerase IV)	MYPU_1880	MG360	no, yes	
188		Hypothetical protein	NA	NA	NA	
191		Hypothetical protein	NA	NA	NA	
197		Hypothetical protein	NA	NA	NA	
198		Hypothetical protein	NA	NA	NA	
214		Lipoprotein	NA	NA	NA	
218		Lipoprotein	NA	NA	NA	
220		Lipoprotein	NA	NA	NA	
221		Lipoprotein	NA	NA	NA	
224		Lipoprotein	NA	NA	NA	
226		Conserved hypothetical lipoprotein	NA	NA	NA	
227		Lipoprotein	NA	NA	NA	
229		Lipoprotein	NA	NA	NA	
230		Hypothetical membrane protein	NA	NA	NA	
234		Lipoprotein	NA	NA	NA	
236		DNA processing protein Smf	MYPU_5470	NA	no, NA	
241		Rhodanese-like domain protein	NA	NA	NA	
242		COF family HAD hydrolase protein	MYPU_3110	NA	no, NA	
243	<i>rnhC</i>	Ribonuclease HIII	MYPU_3000	MG199	no, no	
250		Hypothetical membrane protein	MYPU_5030	NA	yes, NA	
252		Conserved hypothetical protein	MYPU_5020	NA	no, NA	
254		Conserved hypothetical protein	MYPU_5010	NA	no, NA	
258	<i>atpA</i>	ATP synthase F1 alpha subunit	MYPU_7000	MG401	yes, no	
267		Hypothetical protein	NA	NA	NA	
268		Hypothetical protein	NA	NA	NA	
269	<i>ppa</i>	Inorganic pyrophosphatase	MYPU_4700	MG351	no, no	
275	<i>mshL</i>	Massive surface protein	NA	NA	NA	
277	<i>tktA</i>	Transketolase	MYPU_5110	MG066	no, yes	yes
278		Conserved hypothetical protein	NA	NA	NA	
286	<i>rluB</i>	Ribosomal large subunit pseudouridine synthase B	MYPU_3370	NA	no, NA	
288		Conserved hypothetical protein	MYPU_3560	NA	yes, NA	

291		Conserved hypothetical protein	MYPU_3570	NA	yes, NA	
307	<i>recU</i>	Recombination protein U	MYPU_0860	MG352	yes, no	
324		Lipoprotein	NA	NA	NA	
332	<i>ushA</i>	5' nucleosidase	MYPU_0550	NA	yes, NA	
339		O-methyltransferase	MYPU_3080	NA	yes, NA	
345		Lipoprotein	NA	NA	NA	
352		Hypothetical protein	NA	NA	NA	
353		Cysteine protease, lipoprotein, homologous to ORF 582	NA	NA	NA	
358	<i>mspB</i>	MspB	NA	NA	NA	
366		Putative esterase or lipase, membrane protein	MYPU_3130	NA	no, NA	
369	<i>rpsO</i>	Ribosomal protein S15	MYPU_3280	MG424	no, no	yes
372		Conserved hypothetical membrane protein	MYPU_4610	NA	yes, NA	
377	<i>hpt</i>	Hypoxanthine phosphoribosyltransferase	MYPU_5510	MG458	no, no	yes
378	<i>dgk</i>	Deoxyguanosine kinase	MYPU_5520	MG268	yes, no	
380		Hypothetical membrane protein	NA	NA	NA	
381		Very hypothetical protein	NA	NA	NA	
387		conserved hypothetical protein, possible methyltransferase	MYPU_5420	NA	no, NA	
388	<i>ruvA</i>	Holliday junction DNA helicase motor protein	MYPU_6570	MG358	yes, no	
389	<i>ruvB</i>	Holliday junction DNA helicase	MYPU_6580	MG359	yes, no	
404		Hypothetical membrane protein	NA	NA	NA	
422	<i>rplO</i>	Ribosomal protein L15	MYPU_5690	MG169	no, no	yes
448	<i>xfp</i>	Xylulose 5-p-fructose 6-p-phosphoketolase	NA	NA	NA	
456		Conserved hypothetical lipoprotein, putative protease	NA	NA	NA	
459		Hypothetical membrane protein	NA	NA	NA	
469	<i>mspC</i>	Massive surface protein	NA	NA	NA	
471	<i>mspJ</i>	Massive surface protein	NA	NA	NA	
472		MspJ', extension of MspJ	NA	NA	NA	
481	<i>mspD</i>	Massive surface protein	NA	NA	NA	
484		Hypothetical protein	NA	NA	NA	
486		Hypothetical lipoprotein	NA	NA	NA	
488		Hypothetical lipoprotein	NA	NA	NA	
492	<i>mspE</i>	Massive surface protein	NA	NA	NA	
497	<i>mspF</i>	Massive surface protein	NA	NA	NA	
498	<i>atpD</i>	ATP synthase subunit B	MYPU_6990	MG399	no, no	
499	<i>atpA</i>	ATP synthase subunit A	MYPU_7000	MG401	yes, no	
500		Conserved hypothetical membrane protein	MYPU_5000	NA	yes, NA	

501		Conserved hypothetical protein	MYPU_5010	NA	no, NA
505		Conserved hypothetical membrane protein	MYPU_5030	NA	yes, NA
506		Conserved hypothetical lipoprotein	MYPU_5040	NA	yes, NA
508		Conserved hypothetical membrane protein	MYPU_4380	NA	yes, NA
513		Hypothetical membrane protein	NA	NA	NA
518		Conserved hypothetical protein	NA	NA	NA
519		Hypothetical protein	NA	NA	NA
520		COF family HAD hydrolase protein, conserved	MYPU_2440	MG265	no, no
523	<i>rmuC</i>	RmuC domain protein	MYPU_4640	NA	yes, NA
524		Haloacid dehalogenase-like hydrolase	NA	NA	NA
526		MAA2-related membrane protein	NA	NA	NA
533		Lipoprotein, putative acid phosphatase	NA	NA	NA
535		Hypothetical protein	NA	NA	NA
536		Hypothetical protein	NA	NA	NA
538		Membrane protein putative	NA	NA	NA
539		ABC transporter ATP-binding protein	NA	NA	NA
545		Hypothetical protein	NA	NA	NA
548		Hypothetical protein	NA	NA	NA
549		Hypothetical protein	NA	NA	NA
551		Hypothetical protein	NA	NA	NA
555		Conserved hypothetical protein	NA	NA	NA
556		Conserved hypothetical protein	NA	NA	NA
557		Hypothetical protein	NA	NA	NA
558		Hypothetical protein	NA	NA	NA
560		ABC transporter ATP-binding protein	NA	NA	NA
561		Conserved hypothetical protein	NA	NA	NA
562		Predicted helicase	MYPU_1220	MG140	yes, no
564		Hypothetical protein	NA	NA	NA
565		Hypothetical protein	NA	NA	NA
568		Hypothetical protein	NA	NA	NA
571		Hypothetical protein	NA	NA	NA
575		ABC transporter ATP-binding protein, NosF	MYPU_1960	NA	yes, NA
576		Lipoprotein	NA	NA	NA
579		Hypothetical protein	NA	NA	NA
580		Amidohydrolase family protein	NA	NA	NA
582		Lipoprotein, cysteine protease, homologous to ORF 353	NA	NA	NA

591		Hypothetical protein	NA	NA	NA	
598		Conserved hypothetical protein	NA	NA	NA	
600		Hypothetical protein	NA	NA	NA	
601		Hypothetical protein	NA	NA	NA	
605		Hypothetical protein	NA	NA	NA	
606		Hypothetical protein	NA	NA	NA	
611	<i>pepF</i>	Oligoendopeptidase PepF	MYPU_3210	MG183	yes, no	
622		Conserved hypothetical protein	NA	NA	NA	
623		Hypothetical protein, putative ABC transporter permease protein	NA	NA	NA	
626		Proline iminopeptidase	NA	MG020	NA, no	
628	<i>potD</i>	Spermidine/putrescine ABC transporter	MYPU_4220	MG045	no, no	
634	<i>potD</i>	Spermidine/putrescine ABC transporter	MYPU_4220	MG045	no, no	
635	<i>era</i>	GTP-binding protein Era	MYPU_3800	MG387	no, no	
637		Bacteriocin exporter and processing endoprotease	MYPU_3760	MG390	yes, no	
647	<i>mspG</i>	Massive surface protein	NA	NA	NA	
653	<i>mspH</i>	Massive surface protein	NA	NA	NA	
656	<i>fpg</i>	Formamidopyrimidine-DNA glycosylase MutM	MYPU_3100	MG262.1	no, yes	
661		Conserved hypothetical membrane protein	MYPU_2960	NA	no, NA	
663		Membrane protein, homologous to ORF665	NA	NA	NA	
665		Membrane protein, homologous to ORF663	NA	NA	NA	
667		Conserved hypothetical protein	MYPU_2740	NA	no, NA	
668	<i>norM</i>	Putative Na <sup>+</sup> driven multidrug efflux pump	MYPU_2930	NA	no, NA	
673		Conserved hypothetical protein	MYPU_4570	NA	no, NA	
678		Hypothetical protein	NA	NA	NA	
679		Hypothetical protein	NA	NA	NA	
681	<i>hsdM</i>	DNA methyltransferase	MYPU_4330	NA	yes, NA	
687		Conserved hypothetical protein, expressed in <i>M. mobile</i>	MYPU_2260	MG103	yes, no	
694	<i>rpsR</i>	Ribosomal protein S18	MYPU_6090	MG092	yes, no	yes
698	<i>hlyC</i>	Putative hemolysin	MYPU_5140	MG146	no, no	
699	<i>def</i>	Polypeptide deformylase	MYPU_6890	MG106	no, no	
708	<i>oppB</i>	Oligopeptide ABC transporter, permease	MYPU_2830	MG077	no, no	
709		Conserved protein	MYPU_1760	NA	no, NA	
711		Hypothetical protein	NA	NA	NA	
719	<i>rpe</i>	Ribulose-phosphate 3-epimerase	MYPU_6830	MG112	no, yes	
720		Conserved membrane protein	MYPU_0480	NA	no, NA	
722		Lipoprotein	NA	NA	NA	

723		Membrane nuclease		MYPU_6940	NA	yes, NA	
727	<i>mspK</i>	Massive surface protein		NA	NA	NA	
729		Hypothetical protein related to the MAM superantigen		NA	NA	NA	
734		Lipoprotein		NA	NA	NA	
738	<i>adhA</i>	Alcohol dehydrogenase		NA	NA	NA	
746		Fragmented putative adhesin MAA1		NA	NA	NA	
754	<i>trmA</i>	RNA methyltransferase TrmA family (see ORF 131)		NA	NA	NA	
755	<i>trmE</i>	tRNA modification TrmE		MYPU_0130	MG008	no, no	
783	<i>tex</i>	Transcription accessory protein		NA	NA	NA	
789	<i>gidA</i>	Glucose inhibited division protein A		MYPU_2530	MG379	no, no	
790		Conserved hypothetical protein		MYPU_2540	NA	yes, NA	
792		Lipoprotein		NA	NA	NA	
793		Lipoprotein, closely related to protective antigen MAA2		NA	NA	NA	
795		Conserved hypothetical protein		NA	NA	NA	
796		Hypothetical protein		NA	NA	NA	
801	<i>lemA</i>	LemA protein		MYPU_7580	NA	no, NA	
803		Hypothetical protein		NA	NA	NA	
809		Hypothetical protein		NA	NA	NA	
811		Lipoprotein		NA	NA	NA	
815	<i>ung</i>	Uracil-DNA glycosylase		MYPU_6150	MG097	yes, no	
816	<i>fnt</i>	Methionyl-tRNA formyltransferase		MYPU_0450	MG365	no, no	yes
819		Macrophage activating lipoprotein-404 precursor, sugar ABC transporter binding lipoprotein		MYPU_3460	NA	yes, NA	
821		Sugar ABC transporter ATP-binding protein		MYPU_6190	MG119	yes, no	
822		Sugar ABC transporter permease protein		MYPU_6180	MG120	yes, no	
823		Sugar ABC transporter permease protein		MYPU_6170	MG121	no, yes	
825		Membrane protein		NA	NA	NA	
826		Hypothetical protein		NA	NA	NA	
827		Hypothetical protein		NA	NA	NA	
828		Conserved hypothetical protein		MYPU_0580	NA	yes, NA	
830		DHH family phosphoesterase		MYPU_6920	MG190	no, no	
831		DHH family phosphoesterase		MYPU_0220	MG190	yes, no	
844		Lipoprotein		MYPU_3200	NA	yes, NA	
847	<i>pcrA, uvrD</i>	ATP-dependent DNA helicase		MYPU_6980	MG244	yes, yes	yes
852	<i>recD</i>	Exodeoxyribonuclease V, alpha subunit		MYPU_7820	NA	no, NA	
861	<i>pstS</i>	Phosphate binding protein, lipoprotein		NA	MG412	NA, yes	
863	<i>pstA</i>	Phosphate ABC transporter permease protein		NA	MG411	NA, yes	

864	<i>pstB</i>	Phosphate ABC transporter ATP-binding protein	NA	MG410	NA, yes
865	<i>phoU</i>	Phosphate transport system regulatory protein	NA	MG409	NA, no
867		FMN oxidoreductase	MYPY_7720	NA	yes, NA
868		Hypothetical membrane protein	NA	NA	NA
871		Membrane nuclease, lipoprotein	MYPY_1390	NA	yes, NA
874		Membrane nuclease, lipoprotein	NA	NA	NA
876		Hypothetical protein	NA	NA	NA

<sup>a</sup>MYPY\_#

<sup>b</sup>MG#

<sup>c</sup>Essential genes in *M. pulmonis* (Mp), *M. genitalium* (Mg) and *B. subtilis* (Bs) as reported by French et al., Glass et al., and Kobayashi et al. (1-3).

<sup>d</sup>Marth\_orf019 appears to be a fusion of *oppF* (first half of fused gene) and the valyl tRNA synthetase gene *valS*. All transposon disruptions were in the *oppF* portion of the gene.

## References

1. **French, C. T., P. Lao, A. E. Loraine, B. T. Matthews, H. Yu, and K. Dybvig.** 2008. Large-scale transposon mutagenesis of *Mycoplasma pulmonis*. *Mol. Microbiol.* doi:10.1111/j.1365-2958.2008.06262.x.
2. **Glass, J. I., N. Assas-Garcia, N. Alperovich, S. Yooseph, M. R. Lewis, M. Maruf, et al.** 2006. Essential genes of a minimal bacterium. *Proc. Nat. Acad. Sci. USA* **103**:425-430.
3. **Kobayashi, K., S. D. Ehrlich, A. Albertini, G. Amati, K. K. Andersen, M. Arnaud, et al.** 2003. Essential *Bacillus subtilis* genes. *Proc. Nat. Acad. Sci. USA* **100**:4678-4683.