

			368		412
			WLRKLLAWQNDIADSGEIMA	A	EMRSQVFDDRYYVFTPKGEVIDLP
<i>Actinobacillus</i> <i>sensu stricto</i>	Act pleuropneumonia ser. 5b str. L20	126207889	-----D--T---V--	-L-----V--	
	Act pleuropneumoniae ser 6 str. Femo	306860648	-----D--T---V--	-----R-----	
	Act pleuropneumonia ser. 5b str. 5b str. L20	126096681	-----D--T---V--	-----R-----	
	Act pleuropneumoniae ser 2 str. 4226	302648616	-----D--T---V--	-----R-----	
	Act pleuropneumoniae ser 2 str. S1536	306856105	-----D--T---V--	-----R-----	
	Act pleuropneumoniae ser 4 str. M62	306858326	-----D--T---V--	-----R-----	
	Act pleuropneumoniae ser 10 str. D13039	306865081	-----D--T---V--	-----R-----	
	Act pleuropneumoniae ser 12 str. 1096	306869447	-----D--T---V--	-----R-----	
	Act pleuropneumoniae ser 13 str. N273	306871633	-----D--T---V--	-----R-----	
	Act pleuropneumoniae ser 1 str. 4074	306853881	-----D--T---V--	-----R-----	
	Act pleuropneumoniae ser 9 str. CVJ13261	306862884	-----D--T---V--	-----R-----	
	Act pleuropneumoniae ser 11 str. 56153	306867306	-----D--T---V--	-----R-----	
	Act pleuropneumonia ser. 7 str. AP76	190149698	-----D--T---V--	-S-----	
	Pasteurella pneumotropica	517167434	-----D--T---V--	-L-----V--	
	Actinobacillus capsulatus	517481243	-----D--T---V--	-----R-----	
Other <i>Pasteurellales</i>	Avibacterium paragallinarum	545595425	-----D--T---S-VI-	-L-----	
	Actinobacillus suis H91-0380	407692614	-----D--T---V--	-----R-----	
	Actinobacillus ureae	491834566	-----D--T---V--	-----R-----	
	Actinobacillus minor	492371309	-----D--T---V--	-----V--	
	Actinobacillus succinogenes 13	152977877	-----A-----G-VG	---T-I-----V--	
	Mannheimia succiniciproducens	52424296	-----H--SN--VVP	-L-T-----V--	
	Pasteurella bettyae	492134420	-----H--S-A--VVP	-L-T-----Q--	
	Pasteurella multocida 36950	378775075	-----D--T---V--	-----	
	Pasteurella multocida subsp. m	15603730	-----D--T---V--	-----	
	Pasteurella dagmatis	492150615	-----D--T---V--	-----	
	Mannheimia haemolytica USDA-AR	472334407	-----E----L---DMV-	-----I-----R-----	
	Bibersteinia trehalosi USDA-AR	470167385	-----D--T---V--	-----	
	Haemophilus ducreyi 35000HP	33152293	-----L--V--SDM--	D----I-----R-----	
	Haemophilus sputorum	494789823	-----D--T---V--	-----V--	
	Haemophilus parahaemolyticus	491987266	-----D--T---V--	-----R-----	
	Haemophilus paraphrohaemolytic	491989861	-----D--T---V--	-----R-----	
	Haemophilus parasuis SH0165	219870950	-----D--K---D--V--	-----V--	
	Haemophilus somnus 129PT	113460244	-----D--T---V--	-----V--	
	Haemophilus parainfluenzae T3T	345428882	-----D--T---V--	-L-----V--	
	Haemophilus sp. oral taxon 851	497184571	-----D--T---V--	-L-----V--	
	Haemophilus haemolyticus	491876336	-----D--T---V--	-L-----V--	
	Haemophilus influenzae R2846	386265268	-----D--T---V--	-L-----V--	
	Haemophilus influenzae 10810	378696520	-----D--T---V--	-L-----V--	
	Haemophilus influenzae Rd KW20	16272286	-----D--T---VL-	-L-----V--	
	Haemophilus influenzae PittEE	148825382	-----D--T---VL-	-L-----V--	
	Haemophilus influenzae 86-028N	68248939	-----D--T---VL-	-L-----V--	
	Haemophilus influenzae F3047	319775796	-----D--T---VL-	-L-----V--	
	Haemophilus influenzae F3031	319896667	-----D--T---VL-	-L-----V--	
	Haemophilus influenzae PittGG	148827481	-----D--T---KV--	-L-----V--	
	Haemophilus pittmaniae	494450183	-----D--T---VIE	-L-----V--	
	Haemophilus aegyptius	494054052	-----D--T---VL-	-L-----V--	
	Aggregatibacter actinomycetemc	261867309	-----D--T---V--	-L-----V--	
	Aggregatibacter segnis	493770955	-----D--T---V--	-L-----V--	
	Aggregatibacter aphrophilus NJ	251793350	-----D--T---V--	-L-----V--	
	Gallibacterium anatis UMN179	332289404	-----D-L---VL-	-----	
Other <i>Gammaproteo-</i> <i>bacteria</i> 0/250	Psychromonas ingrahamii 37	119944303	---I---E---EDLVD	-V-----	
	Xenorhabdus nematophila	498909906	---I---EEM--T--MLD	-V-----D----	
	Serratia symbiotica	493761013	---IT--EEM----MLD	-V-----D-V--	
	Alteromonas sp. SN2	333894384	---RI---EEV-E--DMVE	-L-----D----	
	Arsenophonus nasoniae	284009170	---I---EEM----MLD	-V-----D----	
	Sodalis glossinidius str. 'mor	85058488	---I---EEM----MLD	-V-----D-V--	
	Cronobacter sakazakii ATCC BAA	156932730	---I---EEM----MLD	-L-----D-V--	
	Morganella morganii subsp. mor	455738312	---I---EEM----MLD	-V-----D-V--	
	Salmonella enterica	487688971	---I---EEM----MLD	-V-----D-V--	
	Shigella flexneri	491272795	---I---EEM----MLD	-V-----D-V--	
	Citrobacter freundii	489124323	---I---EEM----MLD	-V-----D-V--	
	Escherichia coli	446148970	---I---EEM----MLD	-V-----D-V--	

Supplementary Figure 1

Partial sequence alignment for GTP pyrophosphokinase. The protein contains 1 aa insertion that is specific for *Actinobacillus sensu stricto*.

			359		400
	Actinobacillus ureae ATCC 25976	322119155	TITGGKLMTYRLMAEWATDLVCKKLNKSDR	L	CSTAERPLPGS
	Actinobacillus suis H91-0380	407692608	-----T-----	-	-----
	Actinobacillus suis ATCC 33415	672592320	-----T-----	-	-----
	Actinobacillus capsulatus	517481249	-----	-	-----
	Act. pleuropneumonia ser. 3 str. JL03	165975838	-----	-	-----
	Act. pleuropneumonia ser. 6 str. Femo	302651308	-----	-	-----
	Act. pleuropneumonia ser. 2 str. 4226	302648590	-----	-	-----
	Act. pleuropneumonia ser. 12 str. 1096	306869420	-----	-	-----
Actinobacillus sensu stricto	Act. pleuropneumonia ser. 4 str. M62	306858454	-----	-	-----
	Act. pleuropneumonia ser. 2 str. S1536	306856077	-----	-	-----
	Act. pleuropneumonia ser. 10 str. D13039	306865053	-----	-	-----
	Act. pleuropneumonia ser. 13 str. N273	306871605	-----	-	-----
	Act. pleuropneumonia ser. 1 str. 4074	306853852	-----	-	-----
	Act. pleuropneumonia ser. 9 str. CVJ13261	306862854	-----	-	-----
	Act. pleuropneumonia ser. 11 str. 56153	306867274	-----	-	-----
	Act. pleuropneumonia ser. 5b str. L20	126207863	-----	-	-----
	Act. pleuropneumonia ser. 7 str. AP76	190149672	-----	-	-----
	Actinobacillus minor	492378962	-----	-	-----
	Actinobacillus succinogenes 13	152977891	-----VNKK	-E--D-T----	
	Mannheimia succiniciproducens	52308100	-----Q--N-KK	-E-SD-T----	
	Pasteurella bettyae	492141813	-----N-KT	-E--D-V----	
	Pasteurella dagmatis	492153891	-----NAE	-V--KQA----	
	Pasteurella multocida subsp. m	15603307	-----HAE	-V--TQ-----	
	Pasteurella multocida 36950	378775293	-----HAE	-V--TQ-----	
	Gallibacterium anatis UMN179	332289452	-----I-----HQAE	-K--KQ-----	
	Bibersteinia trehalosi USDA-AR	470167686	-----G-TE-	-T-H-----	
	Haemophilus ducreyi 35000HP	33152271	-----VS-	-I---CA----	
	Haemophilus parasuis SH0165	219871479	-----T--	-V---KA----	
Other Pasteurellales	Haemophilus pittmaniae	494450103	-----TA-	-T--D-----	
	Haemophilus parainfluenzae T3T	345429343	-----TA-	-T-----	
	Haemophilus influenzae F3031	319897870	-----TV-	-T-----	
	Haemophilus influenzae Rd KW20	16272627	-----TA-	-V---Q-----	
	Haemophilus influenzae PittGG	148827859	-----TA-	-V---Q-----	
	Haemophilus influenzae 86-028N	68249264	-----TA-	-V---Q-----	
	Haemophilus influenzae R2846	386266588	-----TA-	-V--KQ-----	
	Haemophilus influenzae F3047	319775464	-----TA-	-V---QA-----	
	Haemophilus influenzae 10810	378696883	-----TA-	-V---QA-----	
	Haemophilus influenzae PittEE	148826678	-----TA-	-V---QA-----	
	Haemophilus haemolyticus	491864144	-----E---TA-	-V---Q-----	
	Plesiomonas shigelloides	499149535	-----S---R---H-AT	-T---K-----	
	Citrobacter rodentium ICC168	283786321	-----A--R--GN-RP	-V--DT-----	
	Serratia marcescens FGI94	440228953	-----N---E--GV-A-	-T---QA-----	
	Morganella morganii subsp. mor	455740577	-----A--A--GITAH	-----E-----	
Other Gammaproteo- bacteria 0/250	Enterobacter asburiae LF7a	345300129	-----Q---A--R--GNTEP	-V--DK-----	
	Klebsiella oxytoca	491003182	-----A--R--GN-VP	-----DT-----	
	Raoultella ornithinolytica B6	481848065	-----A--R--GN-VP	-----DT-----	
	Yersinia pestis	488309597	-----K--E--GI-AA	-T--QV-----	
	Escherichia coli	486207164	-----A--R--GN-RP	-T--DLA-----	
	Shigella flexneri	491270753	-----A--R--GNTRP	-T--DLA-----	
	Vibrio cholerae 0395	147671420	-----A---GNTQS	-Q-HL-----	

Supplementary Figure 2

Partial sequence alignment for anaerobic glycerol-3-phosphate dehydrogenase subunit A. The protein contains 1 aa insertion that is uniquely shared by *Actinobacillus sensu stricto*.

		34	75
	Haemophilus influenzae PittEE	148825193	INDLLPEDAIDPEYYDKLLQTL
	Haemophilus influenzae 22.1-21	144979387	-----
	Haemophilus influenzae 86-028NP	68249130	-----
	Haemophilus influenzae 3655	144985884	-----
	Haemophilus influenzae KR494	543951383	-----
	Haemophilus influenzae R2866	491910936	-----
	Haemophilus influenzae F3047	503292748	-----
	Haemophilus influenzae 10810	505740084	-----
Haemophilus Sensu Stricto	Haemophilus sp. oral taxon 851	497182876	-----V-----E---
	Haemophilus haemolyticus M21639	491862772	-----V-----E---
	Haemophilus haemolyticus M21127	491851008	-----V-----E---
	Haemophilus haemolyticus M19107	491841414	-----V-----E---
	Haemophilus haemolyticus M19501	491847886	-----V-----E---
	Haemophilus parainfluenzae	503830655	-----L-----H-----E---
	Pasteurella pneumotropica	517167701	-----V-----H-----P-----I-
	Haemophilus pittmaniae	343519915	-----V-----E---
	H. sputorum	359299231	VH-H---ELV-A-QIEDII-MI
	H. paraphrohaemolyticus	386390298	VH-H---ELV-A-QIEDII-MI
Other Haemophilus	H. parahaemolyticus	387772261	VH-H---ELV-A-QIEDII-MI
	H. ducreyi	33151868	VH-H---ELV-A-QIEDII-MI
	H. parasuis	167855425	VH-H---ELV-ADQIEDII-MI
	Histophilus somni	170719016	V--H---LV-ADQIEDVI-MI
	Act. pleuropneumoniae	307264154	VH-H---ELV-A-QIEDII-MI
Other Pasteurellales	Act. ureae	322513554	VH-H---ELV-A-QIEDII-MI
	Act. succinogenes	152978401	V--H---LV-TDQIEDII-MI
	Act. minor	257464575	VH-H---ELV-A-QIEDII-MI
	Agg. actinomycetemcomitans	261868195	V--S---ELV-ADQIEDII-MI
	Agg. segnis	315634867	V--S---ELV-ADQIEDII-MI
	Agg. aphrophilus	251793982	V--S---ELV-ADQIEDII-MI
	Man. succiniciproducens	52425815	V--H---ELV-TDQIEDII-MI
	Man. haemolytica	261492895	VH-H---ELV-A-QIEDII-MI
	Past. multocida	383311804	V--H---ELV-A-QIEDII-MI
	Past. dagmatis	260912696	V--H---ELV-A-QIEDII-MI
Other Gammaproteo- bacteria 0/250	Gallibacterium anatis	332288976	V--S---LV-ADQIEDII-MI
	Acinetobacter lwoffii	262376664	V--H--DSITES-QIEDII-M
	Aliivibrio salmonicida	209696105	V--H---EIV-S-QVEDII-MI
	Arsenophonus nasoniae	284008589	V--H---IV-SDQIEDII-MI
	Baumannia cicadellinicola	94676896	V-----IV-SDQIEDII-MI
	Buchnera aphidicola	384227506	V--H---I--S-QI-DII-MI
	Citrobacter freundii	365103141	V--H---IV-SDQIEDII-MI
	Congregibacter litoralis	88704608	V--H---IS--DQVEDII-MI
	Cronobacter turicensis	260599325	V--H---IV-SDQIEDII-MI
	Dickeya dadantii	307129360	V--H---I--SDQIEDII-MI
	Edwardsiella ictaluri	238918478	V--H---IV-SDQIEDII-MI
	Enterobacter aerogenes	336247240	V--H---IV-SDQIEDII-MI
	Erwinia amylovora	292486903	V--H---IV-SDQIEDII-MI
	Escherichia coli	377982750	V--H---IV-SDQIEDII-MI
	Grimontia hollisae	262275021	V--H---IV-SDQIEDII-MI
	Klebsiella oxytoca	376381681	V--H---IV-SDQIEDII-MI
	Oceanimonas sp. GK1	374336959	V--H--Q-IV-SDQIEDII-MI
	Pantoea agglomerans	390435428	V--H---IV-SDQIEDII-MI
	Photobacterium luminescens	37527834	V--H---IV-SDQIEDII-MI
	Proteus penneri	226327186	V--H---IV-SDQIEDII-MI
	Providencia stuartii	183597880	V--H---IV-SDQIEDII-MI
	Rahnella sp. Y9602	322831339	V--H---IV-SDQIEDII-MI
	Salmonella enterica	213161043	V--H---IV-SDQIEDII-MI
	Serratia odorifera	270263179	V--H---IV-SDQIEDII-MI
	Shewanella baltica	386340136	V--H--A-MV-SDQIEDII-MI
	Shigella boydii	187733221	V--H---IV-SDQIEDII-MI
	Sodalis glossinidius	85058229	V--H---IV-SDQIEDII-MI
	Vibrio fischeri	371493750	V--H---EIV-S-QVEDII-MI
	Xenorhabdus bovienii	290474860	V--H---IV-SDQIEDII-MI
	Yersinia aldovae	238760057	V--H---IV-SDQIEDII-MI
	Yokenella regensburgei	365847769	V--H---IV-SDQIEDII-MI
			NDAGIPVLDEAPESDDMML

Supplementary Figure 3

Partial sequence alignment for Aspartate ammonia-lyase. The protein contains 1 aa (glutamine) insertion that is specific for a clade consisting of *H. influenzae*, *H. aegyptius*, *H. haemolyticus*, *H. sp. oral taxon 851*, *H. parainfluenzae*, and *H. pittmaniae*. The remaining *Haemophilus* species and other *Pasteurellales* and *Gammaproteobacteria* species (250 blasts) do not contain the CSI.

			352	378
<i>Haemophilus Sensu Stricto</i>	Haemophilus influenzae 3655	144986549	DVVLRGVTVVRDGEEI	PPAQIQVSAQP
	Haemophilus influenzae R3021	491888782	-----	-----
	Haemophilus influenzae 10810	505740607	-----	-----
	Haemophilus influenzae KR494	543997178	-----	-----
	Haemophilus influenzae PittGG	500630890	-----	-----
	Haemophilus influenzae PittEE	500625845	-----	-----
	Haemophilus influenzae 22.1-21	491882181	-----	-----
	Haemophilus sp. FF7	692226876	-----	-----
	Haemophilus influenzae Rd KW20	16273272	-----	-----
	Pasteurella pneumotropica	517167151	-----	-----
	Haemophilus pittmaniae	494451436	-----	-----
	Haemophilus haemolyticus M19107	491841549	-----	-----
	Haemophilus haemolyticus M21127	491853823	-----	-----
	Haemophilus parainfluenzae HK262	491967783	-----	-----
	Haemophilus parainfluenzae ATCC 33392	491966042	-----	-----
<i>Other Haemophilus</i>	Haemophilus parainfluenzae T3T1	503831535	-----	-----
	Haemophilus aegyptius	494053950	-----	-----
	H. sp. oral taxon 851	373467219	-----	-----
	H. parasuis	167854584	-----I---KVT	W -APP-----
	H. parahaemolyticus	387773029	-----I-E--VT	W -APP-----
	H. sputorum	359299851	-----I---LT	W -APP-----
	H. paraphrohaemolyticus	386389589	-----E--VT	W -APP-----
	H. ducreyi	33152693	---V---I---VT	W -APP-----
	Histophilus somni	113460378	-----I---VT	W -APP-----T
	Act. ureae	322514553	-----LT	W -APP-----
<i>Other Pasteurellales</i>	Act. pleuropneumoniae	190150168	-----LT	W -APP-----
	Act. succinogenes	152978693	-----I---VT	W -APP-----
	Act. minor	257465417	-----I---VT	W -APP-----
	Agg. segnis	315634400	-----I---VT	W -APP-----
	Agg. actinomycetemcomitans	293390251	-----I---KIT	W -APP-----
	Agg. aphrophilus	251792709	-----I-E--IT	W -APP-----
	Gallibacterium anatis	332288590	---Q---I---VT	W -APP-K----
	Man. haemolytica	254361623	-----LT	W -APP-----L
	Man. succiniciproducens	52425279	---I---I-N--VT	W -APP-K----
	Past. multocida	15602618	-----I---VT	W -APP-----
<i>Other Gammaproteobacteria 0/250</i>	Past. dagmatis	260914246	-----I-E--VT	W -APP-K----
	Aliivibrio salmonicida	209809408	-----KE--VT	W -APP-----
	Enterobacter cloacae	311279548	---V---I-E--VT	W -APP-----
	Escherichia coli	187776147	---I---I-A--IT	W -APP-----
	Grimontia hollisae	262273996	-----K---IT	W -APP-----
	Pantoea ananatis	291617548	---I---I---VT	W -APP----A-
	Pectobacterium carotovorum	227111338	-T-I---I-KE--IT	W -APP-----
	Photobacterium profundum	90412639	-E---L--I-KE--IT	W -APP-K--A-
	Photorhabdus luminescens	37526083	---I---I---KE--MT	W -APP-----
	Proteus penneri	226329945	---I---I-A--VT	W -APP-----
	Providencia stuartii	183599058	---I---I-KQ--IT	W -APP-----
	Salmonella enterica	168235558	---I---I---DIT	W -APP-----
	Vibrio fischeri	197337488	-----KE--VT	W -APP-----
	Vibrionales bacterium	148981352	-----KE--VT	W -APP-----
	Yersinia rohdei	238749352	-T-I---I---KT--VT	W -APP-----

Supplementary Figure 4

Partial sequence alignment for NAD(P) transhydrogenase subunit alpha. This protein region show 1 aa (Tryptophan) deletion that is specific for a clade consisting of *H. influenzae*, *H. aegyptius*, *H. haemolyticus*, *H. sp. oral taxon 851*, *H. parainfluenzae*, and *H. pittmaniae*. The remaining *Haemophilus* species and other *Pasteurellales* or *Gammaproteobacteria* species (250 blasts) do not contain the CSI.

				31		89
<i>Haemophilus Sensu Stricto</i>	Haemophilus influenzae	86-028NP	68249428	LREATSVFAVWFCIVLLYGVLCASNP	MPG	LGILSFIEFLRNPVIVFLNIITLIATLYH
	Haemophilus influenzae	PittGG	148828019	-----	-----	-----
	Haemophilus influenzae	F3031	319897673	-----	-----	-----
	Haemophilus influenzae	R3021	144983972	-----	-----	-----
	Haemophilus influenzae	F3031	317433179	-----	-----	-----
	Haemophilus influenzae	10810	378697034	-----	-----	-----
	Haemophilus influenzae	PittHH	145270132	-----	-----	-----
	Haemophilus influenzae	HK1212	270317146	-----	-----	-----
	Haemophilus influenzae	M19501	341949445	-----	-----	-----
	Haemophilus influenzae	M21127	341950834	-----	-----	-----
	Haemophilus influenzae	M21639	341956009	-----	-----	-----
	Haemophilus haemolyticus		342905181	-----I-----	I-----	-----
	Haemophilus aegyptius		329122840	-----I-----	IL--D-----	-----
	Haemophilus parainfluenzae		325579196	V-----I-----	V-----	-----
	Haemophilus pittmaniae		343517839	-----I-----	M--FD--G--K-----V-----	-----
<i>Other Haemophilus</i>	Haemophilus sp. oral taxon 851		373466532	-----I-----	I-----	-----
	Pasteurella pneumotropica		2516029750	-----I-----	I--H--F-----L-----V-----	-----
	Haemophilus sputorum		359298516	V-----IPT---SL--F---IT-GRGT	FATD-VS-VQ---IVF-L-S-A-I---	-----
	Haemophilus paraphaemolyticus		386389927	V-----AIPT---L-----IA-GNGT	FDTN-VD--K---II--LVS-A-M-L-	-----
	Haemophilus parahaemolyticus		387772210	V-----AIPT---L-----IS-GNGT	FDT--VD--K---II--LVS-A-M-L-	-----
	Haemophilus parasuis		167855691	---S---PT---L--F--LV--GNGT	FATT-VG--Q--V--I-----G-V-LN	-----
	Haemophilus ducreyi		33151306	I---CIATI---L-----IS-GGRH	-EN--S-SQ--L--I---S-AGL---	-----
	Histophilus somni		113461422	M---AIPSL--SL-----I--GQKD	GLQSD--P--Q---II---A-A-AILN	-----
	Act. minor		240948013	V-----AIPT---L-----LIS-GNGT	FATD-LT--K--LI-IF-LVS-V-M---	-----
	Act. ureae		322513266	V---CLAT---L-----IS-GGEG	LEN--S--Q---FI--V-SIA-L---	-----
<i>Other Pasteurellales</i>	Act. pleuropneumoniae		46143534	V---CLAT---L---H--IS-GGGS	LDG--S--Q---FI--V-SIA-L---	-----
	Act. succinogenes		152979472	V---A-PT---L-----FS--D-T	FATD-VG-MQ---MI---S-A-M-L-	-----
	Agg. aphrophilus		251793019	---ALPT---SL-----I--GKAD	GFVMN--P--Q---I-I---VS-A-L-L-	-----
	Agg. segnis		315633841	---A-PT---SL-----I--GKAD	GFVM---P--Q--L--I---S-A-L-L-	-----
	Agg. actinomycetemcomitans		261867504	V---ALPT---SL-----I--GKAD	GF-A---P--Q---I---S-A-L-L-	-----
	Man. succiniciproducens		152979472	V---A-PT---L-----FS--D-T	FATD-VG-MQ---MI---S-A-M-L-	-----
	Man. haemolytica		254362605	V---CLPT---F--AVA-SKGT	FTTD-VD--Q--L--I---S-A-M---	-----
	Past. dagmatis		260914415	A---AIPTL---L-----IS-GNIE	SFGN--A-----I-----G-M-LN	-----
	Past. multocida		15602064	A---AIPTL---L-----IS-G-LD	SFGN--S--K---II-----G-M-LN	-----
	Gallibacterium anatis		332288836	---S---PTI---LE-F--LT--GNGT	FDSN-VN--Q--V--I-----G-V-LN	-----
<i>Other Gammaproteobacteria</i> 0/250	Citrobacter koseri		157147874	---G-A-P---S-E-IF-LFA-KHGA	ESWMG-VG--Q--V--I--L-A-A-A-L-	-----
	Cronobacter turicensis		260599495	---G--P---S---I--LFA-KHG-	ESWAG-VG--Q--V--L-----L-A-L-	-----
	Dickeya zeae		251788028	---G-A-P---S---H--FS-KAG-	E-WGH-VG--Q--L-L-L--VA-L-AVL-	-----
	Edwardsiella tarda		304557750	---SSALEN---S---I---FS-KDGA	A-WE--VA--Q--L-LV---S-LLAVL-	-----
	Enterobacter aerogenes		336248333	---G-A-PT---S---I--LFA-KHGA	ESWEGYVA--Q---I--L--A-A-L-	-----
	Erwinia billingiae		300715026	---ALP-L--SLEMIF-LFA-KNGE	QSWQA-VAV-QH--MLLI--VA-A-A-L-	-----
	Escherichia coli		15804746	---G-A-P---S-E-IF-LFA-KNG-	EAWAG-VD--Q--VI-II-L--A-A-L-	-----
	Grimontia hollisae		262273031	---VLPLIF-TLC-TF-LGS-VLGE	AAWN-WLS-MA--VAIAI--VA-AGS-F-	-----
	Klebsiella pneumoniae		206578658	V--G-A-PT---S---I--LFA-KHGA	ESWAGY-G--Q--V--I--L--A-A-L-	-----
	Pectobacterium atrosepticum		50122891	---G-A-P---S-I-MC-IFA-KNG-	E-WAN-VS--Q--L-LII--VA-L-AAL-	-----
	Photobacterium profundum		54310447	V---ILPLIF-T-C-TF-LG--VKG-	EAWAGWLS-MS-----V--LA-LGS-F-	-----
	Providencia alcalifaciens		212710997	M--S---LQ---S-LV---FA-KNG-	ESWAG-VG--S---ILII--V-A--L-	-----
	Salmonella enterica		194448129	---G-A-P---S-E-IF-LFA-KHGA	ESWMG-VG--Q--V--I--L--A-A-L-	-----
	Serratia odorifera		293393230	---G---P---S---I---FA-KGG-	DSWVG--G--Q--L-LII--VA-L-A-L-	-----
	Shigella dysenteriae		82779425	---G-A-P---S-E-IF-LFA-KNG-	EAWAG-VD--Q--VI-II-L--A-A-L-	-----
	Vibrio cholerae		15642653	V---VLPLIL-TLF-TV-LGS-VKG-	EAWQTWLD-MA--L-IAI-LVA-AGS-F-	-----
	Vibrionales bacterium		148976863	---VLPLIL-TVF-TF-LGA-VKG-	EAWAGWLS-MA---I-GI--VA-LGS-M-	-----
	Xenorhabdus nematophila		300721664	---G---P---SLLV---LFA-KNG-	ESWAG-VA--Q---LLI---L-A-L-	-----
	Yersinia pestis		22124529	---G--IP---SVL-I---FA-K-G-	A-WEG-VS--Q--L-L-L---L--F-A-L-	-----

Supplementary Figure 5

Partial sequence alignment for Fumarate reductase subunit C. The protein contains 3 aa insertion that is specific for a clade consisting of *Haemophilus influenzae*, *Haemophilus aegyptius*, *Haemophilus haemolyticus*, *Haemophilus sp. oral taxon 851*, *Haemophilus parainfluenzae*, and *Haemophilus pittmaniae*. The remaining *Haemophilus* species and other *Pasteurellales* or *Gammaproteobacteria* species (250 blasts) do not contain the CSI.

			17	58
<i>Haemophilus Sensu Stricto</i>	Haemophilus influenzae 22.1-21	145636352	NIGSAARAMKTMGLTQLCLVSPKS	VDEQSYALSAGAENIVKN
	Haemophilus influenzae PittGG	148827519	-----	-----
	Haemophilus influenzae F3047	319775753	-----	-----
	Haemophilus influenzae F3031	319896709	-----	-----
	Haemophilus influenzae KW20	20178339	-----	-----
	Haemophilus influenzae NT127	260094339	-----	-----
	Haemophilus influenzae R2866	386263423	-----	-----
	Haemophilus influenzae PittII	309750201	-----	-----
	Haemophilus influenzae 10810	378696563	-----	-----
	Haemophilus influenzae PittAA	145268169	-----	-----
	Haemophilus influenzae R2846	386265225	-----	-----
	Haemophilus influenzae 86-028NP	68057182	-----	-----
	Haemophilus influenzae 3655	144986822	-----	-----
	Haemophilus influenzae 7P49H1	229810560	-----	-----
	Haemophilus influenzae 6P18H1	229812781	-----	-----
	Haemophilus influenzae PittHH	145270517	-----	-----
	Haemophilus influenzae Rd KW20	16272328	-----	-----
	Haemophilus haemolyticus	142904025	-----	-----D-----
	Haemophilus aegyptius	329123594	-----	-----
	Haemophilus parainfluenzae	301155740	-----SN-Y-----	-----I--A---DDL-R-
Other <i>Haemophilus</i>	Haemophilus pittmaniae	343519305	-----NE-Y-----C	I----I--A---DD--I-
	Pasteurella pneumotropica DSM 21403	516029676	-----S-----V	-----I--A---AD----
	Haemophilus sp. oral taxon 851	373467487	-----A-----	-----D-----
	Haemophilus sputorum	359299850	----V-----H-----A-QK	A I---AV--A---KDVLD-
	Haemophilus parasuis	167854979	-----SR-R--A--Q	A I---AI--A---KDVLD-
	Haemophilus ducreyi	33152694	-----SN-R--R--N	P L---AT--A---K--LD-
	Haemophilus paraphrohaemolyticus	386389590	-----ISH-R--A--Q	P L---DAF-----KDLLE-
	Haemophilus parahaemolyticus	387773034	----V-----SH-R--E--R	P L---DAF-----KDLLE-
	Histophilus somni	113460425	-----N-----A--Q	G I---AV--A---DV--S
	Act. pleuropneumoniae	307254675	-----SN-R-----LN	P I---Q--A---KDVLD-
Other <i>Pasteurellales</i>	Act. minor	240943933	----T-----A-----Q	P I---AVS-A---KDVLD-
	Act. succinogenes	152978538	-----N-Y--A---	R I-A-AV-----DVI--
	Act. ureae	322514554	-----SN-R-----LN	P I---AQ--A---KDVLD-
	Agg. aphrophilus	251792921	-----D-V--A--Q	G --D-AI--A---DL--S
	Agg. actinomycetemcomitans	293390584	-----D-V--A--Q	S ---AI--A---DV--S
	Agg. segnis	315633898	----T-----D-V--A--Q	G --D-AI--A---DV--S
	Man. succiniciproducens	52425783	-----AN-Y-----Q	G I---AV-----DVLRK
	Man. haemolytica	261493539	-----H-R--A--Q	P L---AE--A---KDVLD-
	Past. dagmatis	260912947	-----SH-Y--A-RQ	A I---AI-----DV--Q
	Past. multocida	15602181	-----N--Y--A--Q	P L---HAI-----DVL-Q
Other <i>Gammaproteobacteria</i> 0/250	Gallibacterium anatis	332289843	-----S--Y-----V	L PN-E-I-----DDV--Q
	Aeromonas hydrophila	117618072	-M-----S-MV--D-QA	Q P-DNA-----SDLLA-
	Alteromonadales bacterium	119470463	-----SK-Y--D-AC	E I-SHAS-----SDVLG-
	Ferrimonas balearica	308050472	-----S--F-AE--V	A P-G--I--A---SDLL--
	Grimontia hollisae	262274801	-----V---KHMV--A-EC	K --G-AI--A---SD-AN-
	Photobacterium damsela	269103289	-----V---N-V--D-AC	E I---AM--A---SD--E-
	Proteus penneri	226328027	-M--T-----N-YF-N--E	K P-SH-I-----SDVIG-
	Pseudoalteromonas haloplanktis	332532349	-----SK-Y--D-AC	E I-S-AS--A---TDVLG-
	Pseudoxanthomonas suwonensis	319787464	---A-----SR-V---EK	P L-DTA-RR-----DVLDS
	Psychromonas ingrahamii	119945066	-V-----K-V--T-EC	E I-GK-I-----SDVL--
	Shewanella loihica	127513248	----T-----ST-Y-AE--V	A P-G--V--A---SD-L-H
	Shigella dysenteriae	194432193	----V-----N-W--N-LV	K P-S-AI--A---SDVIG-
	Sodalis glossinidius	85059749	----T-----SN-Y--N-LH	K P-A-AI-----SD-IG-
	Tolumonas auensis	237808766	-----S--V--D-VQ	P P--K-T--A---ND-LA-
	Vibrio angustum	90579380	-----V---N-V--D-AC	E ---GHTI--A---ADV-E-
	Vibrionales bacterium	148979594	-----V---S--V--D-QC	E ---TL--A---GD-AE-
	Xanthomonas fuscans	294624425	---A-----VSR-V--A-ER	A L--DA-RR-----DVL SQ
	Xenorhabdus bovienii	290476021	-M-----N-Y--N-LV	Q P-SH-I-----SDVIG-
	Yersinia intermedia	238795106	-M--T-----N-Y--N-LV	K P-S-AI-----SDVIG-

Supplementary Figure 6

Partial sequence alignment for Hypothetical tRNA/rRNA methyltransferase. This protein region show 1 aa deletion that is specific for a clade consisting of *Haemophilus influenzae*, *Haemophilus aegyptius*, *Haemophilus haemolyticus*, *Haemophilus sp. oral taxon 851*, *Haemophilus parainfluenzae*, and *Haemophilus pittmaniae*. The remaining *Haemophilus* species and other *Pasteurellales* or *Gammaproteobacteria* species (250 blasts) do not contain the CSI.

			197	253
<i>Haemophilus Sensu Stricto</i>	<i>H. influenzae</i> R3021	144984261	ATRSGIETIIAPGNRPNIADLAYEQNIGTKFIA	H QSDRLSRKQWLFAAPSAGIIT
	<i>H. influenzae</i> 3655	144987185	-----	-----
	<i>H. influenzae</i> PittAA	145268512	-----	-----
	<i>H. influenzae</i> 22.4-21	145273391	-----	-----
	<i>H. influenzae</i> 6P18H1	229813038	-----	-----
	<i>H. influenzae</i> M19107	341951493	-----	-----
	<i>H. influenzae</i> F3047	317449758	-----	-----
	<i>H. influenzae</i> M21127	341949145	-----	-----
	<i>H. influenzae</i> 10810	378697101	-----	-----
	<i>H. influenzae</i> PittHH	145269827	-----	-----
	<i>H. influenzae</i> NT127	260095321	-----	-----
	<i>H. influenzae</i> R2866	386264654	-----	-----
	<i>H. influenzae</i> PittII	145272608	-----	-----
	<i>H. aegyptius</i>	329122915	-----V	-----
	<i>H. haemolyticus</i>	342903547	-----I-----	-----
	<i>H. pittmaniae</i>	343517903	-----A--V---QKP-----	-A-----CV-TL-
	<i>H. parainfluenzae</i>	345429559	-----S-D-V---DKP-----	H-----ML-
	<i>H. sp. oral taxon 851</i>	373467991	-----	-----
Other <i>Haemophilus</i>	<i>Pasteurella pneumotropica</i>	2516030440	-----V---H-G---T-	HA-----A--
	<i>H. paraphrohaemolyticus</i>	386389256	-----V-----S-S-E--LV--NGHA--S--L-	-----G-----QV-S-V
	<i>H. parahaemolyticus</i>	387772439	-----V-----S-S-E--LV--NG-A--S--VV	-----G-----QV-S-V
	<i>H. parasuis</i>	167855493	-I---V--A--S-E---FEV-QGAE---R-L-	-H-KI-G-----G-P--T-Y
	<i>H. sputorum</i>	359300234	-----V-----S-S-E--LV--NGKA--S--LV	-----G-----QV-S-Y
	<i>Histophilus somni</i>	170718754	-----V-----LE---VN--GKD---VV	-T-----I---V---V-
	<i>Act. succinogenes</i>	152978396	-----V-----D--T--HGKS---TV	APEH-----VVI
	<i>Act. minor</i>	240948719	-----V-----S-S-E--LV--NGKE--S--LV	-----G-----QV-S--
	<i>Act. pleuropneumoniae</i>	307254720	-----V--V--S-S-A--LV--NGES--S--LV	-----G-----QV-SLV
	<i>Act. ureae</i>	322514098	-----V-----S-S-E--LV--NDVA--S--LV	-----C--G-----QV-AL-
Other <i>Pasteurellales</i>	<i>Agg. actinomycetemcomitans</i>	347991576	-----Q---V-----P-----V	-A-----VL-
	<i>Agg. aphrophilus</i>	347813523	-----QA---V-----A---TV	-A-----VLV
	<i>Agg. segnis</i>	315633625	-----Q---V---D-A---TV	-A-----VL-
	<i>Man. haemolytica</i>	254361022	-----V---G-A---SV	-A-----Y-
	<i>Man. succiniciproducens</i>	52307969	-----E-----HGEA---TV	-T-K-----L-
	<i>Past. dagmatis</i>	260912819	-----S-----GET-----	-----Y-----
	<i>Past. multocida</i>	386835057	-----V---G-A---SV	-A-----Y-----
	<i>Gallibacterium anatis</i>	332289427	-----G-K---L---NNLA---TV	PPHAI-----IT-H--
	<i>Arsenophonus nasoniae</i>	284007761	-G-A---V---A-DK-----NVLEG-QV---HC	LKTPM--N--R-I-G--L--E-V
	<i>Citrobacter koseri</i>	157147175	-C-A--D---A-SK-G--G-VMAGISA--R-H-	-ASP--N--R-I-G--P--E--
Other <i>Gammaproteobacteria</i> 0/250	<i>Cronobacter sakazakii</i>	156935258	-G-A---V--A-SK-G--N-VIEGLPV--R-HP	-QTP--N--R-I-G--P--E--
	<i>Dickeya dadantii</i>	307132275	-C---DV---A---TG---VINDVSV--R-H-	LETP---R-I-G--P--E--
	<i>Edwardsiella ictaluri</i>	238918850	-C-A--VV--A-S--G--GEVIDGISV--R-HP	LQTP--N--R-I-G--P--E-V
	<i>Enterobacter aerogenes</i>	336248914	-C-A--D---A---D--GHAMEGLPV--C-H-	-ESP--N--R-I-G--P--E--
	<i>Erwinia amylovora</i>	292487375	-C-A--D---A-S--G--G-AIACNPV--R-H-	LETP--N--R-I-G--P--ELV
	<i>Escherichia coli</i>	15799947	-C-A--D---A-SK-G--G-VMEGISV--L-H-	-ATP--N--R-I-G--P--E--
	<i>Hafnia alvei</i>	365837494	-C-A--DV---A-SK-G-VG-VIDGVSV--R-H-	LETP--N--R-I-G--P--E--
	<i>Klebsiella oxytoca</i>	376388964	-C-A--D---A-S--G--G-VMEGVSV--R-H-	-ESP--N--R-I-G--P--E--
	<i>Pantoea ananatis</i>	291616445	-C-A--DV---A-S-SG--S-VIAGKPV--L-H-	-QTP--N--R-I-G--P--E--
	<i>Photorhabdus asymbiotica</i>	253990692	-G-A--DV-V-A-SKS---S-VIEGNPV--R-HG	LASPM--N--R-I-G--P--E-I
	<i>Proteus mirabilis</i>	227357828	-G-A--DVV--A-VK-D--SKVIDNEPV--L-HG	LKSP--T--R-I-G--V--V-I
	<i>Providencia alcalifaciens</i>	212709386	-G-A--DV---A--K-D--NAVIENIPV--R-YG	-KNPM--N--R-I-G--A--DVY
	<i>Rahnella aquatilis</i>	383188939	-C-A--VD---A-SL-G--G-VINGVSV--R-H-	METP--N--R-I-G--P--E--
	<i>Salmonella enterica</i>	56414551	-C-A--D---S-SK-G--G-VMEGISV--R-H-	-ASP--N--R-I-G--P--E--
	<i>Serratia marcescens</i>	130967	-C-A--DVV--A-SK-G-V--VIEGKPV--R-H-	LETP--N--R-I-G--P--E--
	<i>Shigella dysenteriae</i>	320176707	-C-A--D---A-SK-G--G-VMEGISV--L-H-	-ATP--N--R-I-G--PG-E--
	<i>Sodalis glossinidius</i>	85058578	-N-A---VV--A-GK-G--G-MMAGASV--R-HG	-KMP-----R--GP-P--D--
	<i>Xenorhabdus bovienii</i>	290476274	-G-A--VDV--A---E-V--VIEGKSV--R-HG	-ACPM--N--R-I-G--P--E-I
	<i>Yersinia aldovae</i>	238760030	-C-A--DVV--A-SQVG---VIDGTPV--R-H-	LETP--T--R-I-G--P--E--
	<i>Yokenella regensburgei</i>	365848145	-C-A--D---A-S--G--G-VMEGVSV--R-H-	-ASP--N--R-I-G--P--E--

Supplementary Figure 7

Partial sequence alignment for Gamma-glutamyl kinase. The protein contains 1 aa (Histidine) insertion that is specific for a clade consisting of *H. influenzae*, *H. aegyptius*, *H. haemolyticus*, *H. sp. oral taxon 851*, *H. parainfluenzae*, and *H. pittmaniae*. The remaining *Haemophilus* species and other *Pasteurellales* or *Gammaproteobacteria* species (250 blasts) do not contain the CSI. *Haemophilus ducreyi* do not contain the homologue protein.

			119	159
<i>Haemophilus</i> <i>Sensu Stricto</i>	Haemophilus influenzae HK1212	270317394	GSEGLKKGKKAIVLCAFGGLYDEE	NLVQYMKSIILGFIGIT
	Haemophilus influenzae 86-028NP	68250119	-----	-----
	Haemophilus influenzae R2846	386265814	-----	-----
	Haemophilus influenzae KR494	543952153	-----	-----
	Haemophilus influenzae 3655	144986545	-----	-----
	Haemophilus influenzae 6P18H1	229813169	-----	-----
	Haemophilus influenzae 7P49H1	229810271	-----	-----
	Haemophilus influenzae R2866	386264219	-----	-----
	Haemophilus influenzae 22.1-21	144978396	-----	-----
	Haemophilus influenzae PittHH	145270596	-----	-----
	Haemophilus aegyptius	329123507	-----F-----	-----
	Haemophilus haemolyticus	342904212	-P-----	-----V-----
	Haemophilus pittmaniae	343519865	-P-----D-----A-C-M--D	-N--N-L-A--D-V--
	Haemophilus parainfluenzae	325578420	-P---Q-----AS--M--N	-N--N-L-A---V--
	Haemophilus sp. oral taxon 851	373467223	-P-----	-----
Other <i>Haemophilus</i>	Pasteurella pneumotropica DSM 21403	2516029975	-P-----D-----	-----A---V--
	Haemophilus parahaemolyticus	387772242	-----IT---V-ILTY--I-KDG	LA D-PKL--QTV-N----
	Haemophilus paraphrohaemolyticus	386389687	-P---IT-----IL-H--I-KDS	PT D-AKL--QTV-N----
	Haemophilus parasuis	167856647	-P---I---V-VL-H--I-KDG	PA D-AKM--QTV-N----
Other <i>Pasteurellales</i>	Agg. segnis	315634175	-P-----V-A---FHQNQ	PT D---S---A---V---
	Agg. aphrophilus	251792472	-P---T---V-A---FHQNQ	PT D---A-V-T-----
	Agg. actinomycetemcomitans	293390341	-P---T---V-A---FHQNQ	SS DI--A-L-M---V---
	Past. dagmatis	260914079	-P---I---L-ILTS--IHQGS	AT D-AA---IM-----
Other <i>Gammaproteo-</i> <i>bacteria</i> 0/250	Gallibacterium anatis	332288876	-PK---PNVPVFAFVTS--E-EGT	EF DTMSDWV-QV---V-LS
	Cronobacter sakazakii	156933866	-P---VT--R---TSR--IHKDT	PT D---P-LSLF-----
	Dickeya dadantii	271500288	-P---V---R-V---TSR--IHKDT	ES DV-AP-LRLM-----
	Enterobacter cloacae	296102444	-P---V---R---TSR--IHKDT	PT D--AP--SLF-----
	Enterobacteriaceae bacterium	317491990	-P-----VY--TSR--IHKDT	DT D---P-LRVF-----L-
	Erwinia pyrifoliae	259908386	-P---I---VV--SSR--IHKDT	PS D-L-P-LTLF---L-MS
	Escherichia coli	324117609	-P---VT-----ITSR--IHKDG	PT D---P-LSTF---S---
	Grimontia hollisae	262275640	--Q---T---LIVTTR--MHVGQ	SS DHI-G-L-TV---V---
	Pantoea ananatis	291617560	-P---V---R-VI-SSR--IHKDS	PS D-L-P-V-LF-----
	Photorhabdus luminescens	37526065	-P-----QV-I-TSR--IHKDG	PS D-LVP-LRLF-S---L-
	Serratia odorifera	270262050	-P---V---R--I-TSR--IHKGT	PT D--EP-LRLF-----
	Shigella boydii	320178234	-P---VT-----ITSR--IHKDG	PT D---P-LSTF-----
	Vibrio harveyi	153831886	-VQ--IE-----VTTR--HKDS	PT DSM-P-LRTV---V---
	Xenorhabdus bovienii	290475378	-P-----N-R---TSR--IHKDN	PT D-I-P-LRTF-----N
	Yersinia kristensenii	238762559	-P---IT--R--I-TSR--IHKDT	PT D--VP-LRLF-----

Supplementary Figure 8

Partial sequence alignment for ACP phosphodiesterase. The protein contains 2 aa deletion that is specific for a clade consisting of *Haemophilus influenzae*, *Haemophilus aegyptius*, *Haemophilus haemolyticus*, *Haemophilus sp. oral taxon 851*, *Haemophilus parainfluenzae*, and *Haemophilus pittmaniae*. The remaining *Haemophilus* species and other *Pasteurellales* or *Gammaproteobacteria* species (250 blasts) do not contain the CSI.

			412	446
<i>Pasteurella sensu stricto</i>	Past. multocida subsp. m str. Pm70	15602400	DIRSPEETDEKPLNMENV	QLMPFYKLSSQFANLDQ
	Past. multocida subsp. m str. 3480	386834344	-----	-----
	Past. multocida subsp. m str. P52VAC	401689778	-----	-----
	Past. multocida subsp. m str. PMTB	544580593	-----	-----
	Past. multocida subsp. m str. VTCCBAA264	544580593	-----	-----
	Past. multocida subsp. m str. 3480	385201045	-----	-----
	Past. multocida subsp. gallicida	385201045	-----	-----
	Past. multocida subsp. m str. 3480	385201045	-----	-----
	Past. multocida subsp. m P1062	557249467	-----	-----
	Past. multocida subsp. m str. Anand1	338215897	-----	-----
	Past. multocida subsp. m str. HN06	383310178	-----	-----
	Past. multocida 1500C	512763580	-----	-----
	Pasteurella multocida RIIF	512762374	-----	-----
	Pasteurella multocida 93002	512757128	-----	-----
	Pasteurella multocida 671/ 90	512759585	-----	-----
	Pasteurella multocida 36950	378774244	-----	-----
	Pasteurella multocida 1500E	511371788	-----	-----
	Pasteurella multocida 2000	512752228	-----	-----
	Pasteurella multocida P1933	512756828	-----	-----
Other <i>Pasteurellales</i>	Pasteurella dagmatis	492146744	-----N--K-D--	K-----ST---
	Pasteurella pneumotropica	517166719	-----FKSDHH	EV IQ-----SS---
	Pasteurella bettyae	492137292	-----H--R-FSL-GY	EV KHL-----ST-P-
	Mannheimia succiniciproducens	52425117	-----H--R-FELAGH	EV KHL-----GD---
	Actinobacillus succinogenes 13	152979406	-----N--AL--R	QV IEL----V---GE---
	Avibacterium paragallinarum	516417163	-----S--N--QLA-A	KI I-----E---
	Aggregatibacter segnis	493769782	-----I--N--HI--Q	AM I-L-----E---
	Aggregatibacter aphrophilus NJ	251792601	-----I--N--HI--Q	AM I-L-----G---D---
	Aggregatibacter actinomycetemc	365967873	-----I-----HI-KQ	TM I-L-----N---E---
	Gallibacterium anatis UMN179	332288104	-----HE-E--QLD-H	TI LHI-----T--PS---
	Haemophilus somnus 129PT	113461045	-----V-D---EISGQ	NI I-----H--E---
	Haemophilus somnus 2336	170717619	-----V-D---EISGQ	NI I-----H--E---
	Actinobacillus capsulatus	517481949	-----T-FSLDG-	EV K-----S---
	Actinobacillus suis H91-0380	407691879	-----A-FSLDG-	EV K-----S---
	Actinobacillus pleuropneumonia	491785160	-----A-FSLDG-	EV K-----S---
	Actinobacillus ureae	491831251	----S----A-FSLDG-	EV K-----S---
	Actinobacillus minor	492375229	-----V----FSL-G-	EV KEL-----GA---
	Bibersteinia trehalosi USDA-AR	470166787	-----N-FELDG-	NV -I-----NN-GS---
	Mannheimia haemolytica USDA-AR	472333421	-----V----FRLDG-	EV KEL-----ST---
	Haemophilus parasuis SH0165	219870478	-----V----FSL-G-	EV KEL-----NH-G---
	Haemophilus parahaemolyticus	491983005	-----A--ELD--	EV KEL-----TA---
	Haemophilus paraphrohaemolytic	491988803	-----A-FKL-G-	EV KEL-----TE---
	Haemophilus ducreyi 35000HP	33152814	-----M-----VLAQA	QV IEL-----T---H---
	Haemophilus sputorum	494789029	-----E-S-FTL-G-	TV KVL-----GS---
	Haemophilus influenzae 86-028N	68250032	-----FESGTH	DV IQ-----GS---
	Haemophilus aegyptius	494053895	-----N-FESGTH	DV IQ-----GS---
	Haemophilus sp. oral taxon 851	497183028	-----N-FESDTH	EV IQ-----GS---
Other <i>Gammaproteo-</i> <i>bacteria</i> 0/250	Candidatus Regiella insecticol	493756535	---A---QE---DLD	PV HIL-----R---ST---
	Yersinia rohdei	490854420	---A-D-Q---KL-GI	EV -AI-----D---
	Dickeya dadantii 3937	307129908	----D-Q--R--AL-Q-	EI KSL-----GT--GD---
	Plesiomonas shigelloides	499151317	-----EE---VL-G-	TV TC-----T--DT---
	Enterobacteriaceae bacterium s	440288781	----VD-Q-D---KV-G-	EI ASL-----T--G---
	Salmonella enterica	486431237	----VD-Q-D---KV-G-	DV VSL-----TK-GD---
	Brenneria sp. EniD312	496405054	---A-D-QE---TLAQA	EI KSL-----T--GD---
	Serratia marcescens	491078757	----ND-QE---QL-Q-	EV KAL-----T--GD---
	Shewanella sp. W3-18-1	120599623	---A---EEH---I-G-	EV KRI--F--AT--D--K
	Pantoea sp. GM01	495162200	----AD-Q-A---AL-G-	EV KPLA-----T--GD---
	Colwellia psychrerythraea 34H	71280272	-----EED---ELGD-	EV KHI-----T--GD---
	Kosakonia radicincitans	494615276	----ID-Q-D---KL-G-	DV VSL-----TK-GD---

Supplementary Figure 9

Partial sequence alignment for tRNA s(4)U8 sulfurtransferase. The protein contains 2 aa deletion that is specific for *Pasteurella sensu stricto*.

		151	188
	Pasteurella multocida 36950	DTVTVNYTGKLPNGEVFDSS	RGKPVSFKLNQVVPGWTE
	Past. multocida subsp. m str. HN06	-----	-----
	Past. multocida subsp. m str. Anand1	-----	-----
	Past. multocida subsp. m str. gallicida	-----	-----
	Past. multocida subsp. m str. Anand1	-----	-----
	Past. multocida subsp. m str. 3480	-----	-----
	Past. multocida subsp. m str. P52VAC	-----	-----
	Past. multocida subsp. m str. PMTB	-----	-----
	Past. multocida subsp. m str. P1062	-----	-----
<i>Pasteurella sensu stricto</i>	Past. multocida subsp. m VTCCBAA264	-----	-----
	Pasteurella multocida 3695	-----	-----
	Pasteurella multocida 1500E	-----	-----
	Pasteurella multocida 2000	-----	-----
	Pasteurella multocida 671/ 90	-----	-----
	Pasteurella multocida 1500C	-----	-----
	Past. multocida subsp. m str. HB03	-----	-----
	Pasteurella multocida 93002	-----	-----
	Past. multocida subsp. m str. Pm70	-----	-----
	Pasteurella dagmatis	----K-V-----D---RT	H---I-----
	Past. dagmatis ATCC 43325	----K-V-----D---RT	H---I-----
	Haemophilus ducreyi	-I-IAH-K-T--D-T----	YE--NE-IELQ-K-LI-A-I-
	Haemophilus sputorum	--K-H-K-T-VD-S-----	YD--Q-IE---DNLI-A-K-
	Bibersteinia trehalosi	--K-H-K-T-TD-S-----	YE--E-IE-Q-S-LI-A-V-
	Gallibacterium anatis	--K---R---ID-TE----	YK--NQ-IE-Q-G-LI---V-
	Haemophilus paraphrohaemolyticus	-V-K-H-K-T--D-T-----	YD--NA--E-Q-D-LI-A-V-
	Haemophilus parahaemolyticus	-M-K-H-K-T--D-T-----	YD--NA--E-Q---LI---I-
	Actinobacillus minor	-I-K-H-K-T---TT-----	YD--E-IE-Q-D-LI---I-
<i>Other Pasteurellales</i>	Mannheimia haemolytica	--K-H-K-T-TD-T-----	YD--E-IE-Q---LI---I-
	Actinobacillus capsulatus	--K-H-K-T-TD-T-----	YD--E-IE-Q---LI---I-
	Actinobacillus pleuropneumoniae	--K-H-K-T-TD-T-----	YD--E-IE-Q---LI---I-
	Actinobacillus suis	--K-H-K-T-TD-T-----	YD--E-IE-Q---LI---I-
	Actinobacillus ureae	--K-H-K-T-TD-T-----	YD--E-IE-Q---LI---I-
	Avibacterium paragallinarum	-M-K-H-----AD-T-----	VQ--Q-AE-----IK----
	Pasteurella pneumotropica	--K-H-----	VE--Q-AE-R-D---K----
	Pasteurella bettyae	--K-H-----T--T-----	VE--NQ-AE-M---I-----
	Actinobacillus succinogenes 13	-S-K-H-----T-----	VE--Q-AE-A---I-----
	Mannheimia succiniciproducens	-S-K-H-----T--T-----	VE--Q--E-L-D--I-----
	Aggregatibacter segnis	-V-K-H-----D-T-----	VQ--T-AE-P---IK----
	Aggregatibacter aphrophilus	--K-H-----D-T-----	RE--T-AE-P---IK----
	Aggregatibacter actinomycetemc	-V-K-H-----D-T-----	HE--T-AE-P---IK----
	Haemophilus somnus 2336	-R-K-H-----A--K-----	RE--Q-AE-----IL----
	Haemophilus somnus 129PT	-R-K-H-----A--K-----	RE--Q-AE-----IL--K-
	Haemophilus sp. oral taxon 851	--K-H-----K-----	VE--Q--E-Q---IK----
	Haemophilus aegyptius	--K-H-----K-----	VE--Q--E-Q-D--IK----
	Haemophilus parainfluenzae T3T	--K-H-----D-K-----	VE--Q--E-----IK----
	Haemophilus haemolyticus	--K-H-----K-----	VE--Q--E-Q-D--IK----
	Haemophilus influenzae 10810	--K-H-----K-----	VE--Q--E-Q-D--IK----
	Haemophilus pittmaniae	-V-K-H-----AD-K-----	VE--S-AE-----K-----
	Haemophilus parasuis SH0165	--K-H-K-T--D-T-----	YD--E-IE-Q---LI-A-V-
<i>Other Gammaproteobacteria 0/250</i>	Legionella nagasakiensis	-----E---R-I-----T	EK T--A---S--I-----
	Marinobacter sp. ELB17	E-----H---E-L-----	RE--E---R-D--I-----
	Acinetobacter sp. NIPH 1847	--K-H-K-Q--D-K-----	YD--E-IE-P---I-----
	Moritella sp. PE36	-----H---S-LD-S-----	VE--E-AT-A--R-I-----
	Tatlockia micdadei	-V---E-----ID-Q---T	EK T--AT--VS--I-----
	Thalassolituus oleivorans MIL-	-K-L-H-H-T-L--N-----	VK--E-IA-G---I-----
	Shewanella sp. MR-4	-----H-H-T-ID-T-----	VE--E-IA-P--R-I-----
	Psychromonas sp. CNPT3	---H-H-T-LD-T-----	VD--E-I-----IK----
	Idiomarina loihiensis L2TR	-M-E-H-E-T-V-----	YE--E-T--P--R-I-----
	Candidatus Legionella jeonii	-----D---T-LD-Q---TT	EK T--AT--VS--I-----
	Oceanimonas sp. GK1	-V---H---T-VD-TQ----	VE--E-A--P---I-----

Supplementary Figure 10

Partial sequence alignment for FKBP-type peptidyl-prolyl cis-trans isomerase. The protein contains 2 aa deletion that is specific for *Pasteurella sensu stricto*.

		173	245
	Past. multocida subsp. m str. HN06	383311492	PASSILDIERKVTAKMRGDL
	Past. multocida subsp. m str. Anand1_buffalo	401692294	PIENFGAPLAGSLIPWIDK
	Past. multocida subsp. m str. Anand1_poultry	338218682	
	Past. multocida subsp. m str. Anand1_poultry	338217898	
	Past. multocida subsp. m str. 3480	386835511	
	Past. multocida subsp. m str. HN06	380872764	
	Past. multocida subsp. gallicida X73	404381296	
	Past. multocida subsp. gallicida P1059	404381529	
	Past. multocida subsp. m str. VTCCBAA264	662150000	
	Past. multocida subsp. m str. PMTB	544579597	
	Past. multocida subsp. m str. PMTB	557250343	
	Past. multocida subsp. m str. HB03	570283089	
	Past. multocida subsp. m str. Pm70	15603497	
	Past. multocida subsp. m str. P52VAC	401688289	
	Pasteurella multocida 671/ 90	512758580	
	Pasteurella multocida 36950	356598033	
	Pasteurella multocida 1500E	511370980	
	Pasteurella multocida 93002	512754838	
	Pasteurella multocida P1933	512755327	
	Pasteurella multocida RIIF	512761301	
	Pasteurella multocida 1500C	512764053	
	Pasteurella dagmatis	260632372	
	Pasteurella bettyae	492142074	
	Mannheimia succiniciproducens	52424061	
	Actinobacillus succinogenes 13	152977962	
	Aggregatibacter aphrophilus NJ	251793382	
	Aggregatibacter actinomycetemc	491743607	
	Aggregatibacter segnis	493771023	
	Gallibacterium anatis UMN179	332289624	
	Actinobacillus suis H91-0380	407691599	
	Actinobacillus ureae	491830899	
	Actinobacillus pleuropneumonia	2494081	
	Actinobacillus capsulatus	517480854	
	Haemophilus ducreyi	33151282	
	Actinobacillus minor	492378846	
	Haemophilus aegyptius	327473112	
	Haemophilus somnus 2336	170718618	
	Haemophilus somnus 129PT	113461688	
	Haemophilus influenzae F3031	319897820	
	Haemophilus haemolyticus	491840026	
	Haemophilus parainfluenzae T3T	345429175	
	Haemophilus pittmaniae	494451354	
	Haemophilus sp. oral taxon 851	497184927	
	Haemophilus parahaemolyticus	491983155	
	Haemophilus paraphrohaemolytic	491991632	
	Haemophilus sputorum	494791543	
	Haemophilus parasuis SH0165	219871160	
	Mannheimia haemolytica USDA-AR	472334224	
	Bibersteinia trehalosi USDA-AR	470167928	
	Pasteurella pneumotropica	517168125	
	Avibacterium paragallinarum	516415744	
	Dickeya dadantii Ech586	271502355	
	Dickeya zeae Ech1591	251787870	
	Plesiomonas shigelloides	499149527	
	Rahnella sp. Y9602	322830931	
	Hafnia alvei	490192463	
	Yokenella regensburgei	493871072	
	Enterobacter sp. Ag1	495733328	
	Cronobacter malonaticus	495054021	
	Aeromonas diversa	491503773	
	Pantoea sp. Sc1	496378765	
	Edwardsiella tarda EIB202	269140685	
	Halomonas sp. TD01	497409267	
	Escherichia coli UTI89	91212916	
	Yersinia enterocolitica subsp.	332163357	

Supplementary Figure 11

Partial sequence alignment for Aspartate-Semialdehyde Dehydrogenase. The protein contains 1 aa deletion that is specific for *Pasteurella sensu stricto*. No other species harbor this insert.

		357	387
	Pasteurella dagmatis ATCC 43325	260632997	VRIGNPLNITGVTHHV E NKPQYSTVLGLLQY
	Pasteurella multocida 93002	512756477	-----L- -
	Pasteurella multocida 1500C	512763891	-----L- -
	Pasteurella multocida 1500E	511371845	-----L- -
	Pasteurella multocida 2000	512750732	-----L- -
	Pasteurella multocida P1933	512756520	-----L- -
	Pasteurella multocida 671/ 90	512760522	-----L- -
	Pasteurella multocida RIIF	512761903	-----L- -
	Pasteurella multocida 36950	378774785	-----L- -
	Past. multocida subsp. m str. Pm70	15602011	-----L- -
	Past. multocida subsp. m str. HN06	383310759	-----L- -
	Past. multocida subsp. m str. 3480	386834751	-----L- -
	Past. multocida subsp. m str. P1062	557251138	-----L- -
<i>Pasteurella sensu stricto</i>	Past. multocida subsp. m str. P52VAC	401690272	-----L- -
	Past. multocida subsp. m str. PMTB	544580907	-----L- -
	Past. multocida subsp. m VTCCBAA264	662151314	-----L- -
	Past. multocida subsp. m str Anand1_goat	338219119	-----L- -
	Past. multocida subsp. m str Anand1_cattle	01701157	-----L- -
	Past. multocida subsp. m str Anand1_buffalo	401698941	-----L- -
	Past. multocida subsp. m str Anand1_poultry	338216942	-----L- -
	Past. multocida subsp. m str 3480	385201454	-----L- -
	Past. multocida subsp.gallicida X73	404383534	-----L- -
	Past. multocida subsp.gallicida P1059	404383534	-----L- -
	Past. multocida subsp. m P1062	557251138	-----L- -
	Past. multocida subsp. m str. HB03	570282365	-----L- -
	Haemophilus aegyptius	327467404	---AS-----L-DY- R-----V-----
	Avibacterium paragallinarum	516416579	---S-M-----L-DY- -----V-----
	Pasteurella pneumotropica	517168260	--V-S-----L-DY- -R-----I-----
	Haemophilus pittmaniae	494451856	---S-----L-DY- -R-----V-----
	Pasteurella bettyae	492145430	--V-Y---S-L-DY- ----A-----
<i>Other Pasteurellales</i>	Mannheimia succiniciproducens	52425717	--V-Y-----L-DY- ----A-----
	Actinobacillus succinogenes 13	152979582	--V-S-----L-DY- ----A-----
	Aggregatibacter actinomycetemc	491735876	---S-----L-DY- ----A-I-----
	Aggregatibacter segnis	493768770	---S-----L-DY- -----I-----
	Aggregatibacter aphrophilus NJ	251792027	--V-S-----L-DY- ----A-I-----
	Gallibacterium anatis UMN179	332288548	-K--T-----L-DY- ----A-----
	Haemophilus influenzae 10810	378697366	---AS-----L-DY- -R-----V-----
	Haemophilus pittmaniae	494451856	---S-----L-DY- -R-----V-----
	Haemophilus sp. oral taxon 851	497452636	---S-----L-DY- -R-----V-----
	Haemophilus haemolyticus	491875401	---S-----L-DY- -R-----V-----
	Haemophilus parahaemolyticus	491987960	--V-S---A-L-DY- ----A-----
	Haemophilus paraphrohaemolytic	491991888	--V-----A-L-DY- ----A-----
	Haemophilus parasuis SH0165	219870395	--V-----L-DY- ---S-A-----
	Haemophilus sputorum	494790961	--V-----E-L-DY- ----A-----
	Actinobacillus pleuropneumonia	126207510	--V-Y-----L-DY- ----A-----
	Actinobacillus ureae	491831136	--V-Y-----L-DY- ----A-----
	Actinobacillus suis H91-0380	407693004	--V-Y-----L-DY- ----A-----
	Actinobacillus minor	492358394	--V-Y-----L-DY- ----A-----F-
	Mannheimia haemolytica USDA-AR	472333002	--V-Y-----L-DY- ----A-A-----
	Bibersteinia trehalosi USDA-AR	470166543	--V-H-----L-DY- ----A-----

Supplementary Figure 13

A partial sequence alignment of the Cell division protein FtsA depicts the conserved 1 aa insertion shared by *Pasteurella sensu stricto*.

<i>Aggregatibacter</i>	Aggregatibacter actinomycetemcomitans D11S-1	261866907	FTGFGIGVGVGTTKYKDAK	RISNVDLIADYGIDYGNDFVG
	Aggregatibacter actinomycetemcomitans ANH9381	365966720	-----	-----
	Aggregatibacter actinomycetemcomitans D7S-1	387121099	-----	-----
	Aggregatibacter actinomycetemcomitans RhAA1	359757391	-----	-----
	Aggregatibacter actinomycetemcomitans SC1083	347992294	-----	-----
	Agg. actinomycetemcomitans serotype a str. A160	443549786	-----	-----
	Agg. actinomycetemcomitans serotype e str. SCC393	348003778	-----	-----
	Agg. actinomycetemcomitans serotype b str. S23A	443548871	-----	-----
	Agg. actinomycetemcomitans D11S-1	261412239	-----	-----
	Agg. actinomycetemcomitans serotype f str. D18P1	348001357	-----	-----
	Agg. actinomycetemcomitans serotype a str. H5P1	348002279	-----	-----
	Agg. actinomycetemcomitans serotype c str. SCC2302	348004682	-----	-----
	Agg. actinomycetemcomitans serotype b str. SCC1398	348006756	-----	-----
	Agg. actinomycetemcomitans serotype b str. I23C	348010515	-----	-----
	Agg. actinomycetemcomitans serotype c str. D17P-2	348656715	-----	-----
	Agg. actinomycetemcomitans ANH9381	365745633	-----	-----
	Agg. actinomycetemcomitans D7S-1	385875591	-----	-----
	Agg. actinomycetemcomitans Y4	429155976	-----	-----
	Agg. actinomycetemcomitans serotype c str. AAS4A	443542933	-----	-----
	Agg. actinomycetemcomitans serotype b str. SCC4092	443545908	-----	-----
	Agg. actinomycetemcomitans HK1651	601111157	-----	-----
	Aggregatibacter aphrophilus NJ	251793586	---V-D-----	-----N---
	Aggregatibacter aphrophilus NJ8700	247534982	---V-D-----	-----N---
	Aggregatibacter aphrophilus ATCC 33389	347814960	---V-D-----	-----N---
	Aggregatibacter aphrophilus F0387	353345480	---V-D-----	-----N---
<i>Other Pasteurellales</i>	Aggregatibacter segnis	492001274	---V-----E---	-----FNH-QNV--
	Actinobacillus actinomycetemco	19911156	-----	-----
	Actinobacillus ureae	491831195	---V-V--DLT-V--DVDG	VKGK QST-PA -VV---M----N-
	Actinobacillus pleuropneumonia	126207537	---V-V--DLT-V--VDG	VKGK QSTGPA -VV---M---DN-
	Actinobacillus minor	492365015	---L-V--DLT-A---VDG	VKGK QSTGPA -VV---M---SN---
	Actinobacillus suis H91-0380	407692976	---V-V--DLT-V--EVDG	VKGK QSTGPA -VV---M----N-
	Haemophilus sputorum	494791298	---V-V--DLTSA---VDG	IKGK QSTGPA -VV---M----NL--
	Haemophilus paraphrohaemolytic	491991617	---I-VSTDLT-A---ANG	VTGK QSTGP- -VV---M----NL--
	Haemophilus parahaemolyticus	491987783	---V-VSADLT-A---VNG	VTGK QSTGP- -VV---M----NL--
	Haemophilus parasuis SH0165	219871549	---G---MD-T----NGD	LQGK QA-GIN FTL--AT---RNLI-
	Haemophilus ducreyi 35000HP	33151516	---M---IDL-D-A--TSHG	QNGK RKA-PM IVL---M----NL--
	Mannheimia haemolytica USDA-AR	472335694	---I-V--D-T----VEG	VKGK DSTGPA -VV---EQ--N---
	Mannheimia haemolytica M42548	482885642	---I-V--D-T----VEG	VKGK DSTGPA -VV---EQ--N---
	Bibersteinia trehalosi USDA-AR	470167899	---V-V-LDLT-V---NSN	LQGK QATGAN FVL--AL---NVL-
	Simonsiella muelleri	488718971	---ASV-TNIE-----IKN	SISG ENTR-AV-KG-V-F-M--NL--

Supplementary Figure 14

A 4 aa deletion in a conserved region of the Outer membrane protein specific is for *Aggregatibacter*

			190	220
	Agg. actinomycetemcomitans ANH9381	365966332	TVILPTLARHHVNRD	DNVKSAVDFCNTMDWG
	Agg. actinomycetemcomitans D7S-1	387121526	-----	-----
	Agg. actinomycetemcomitans serotype b str. I23C	348008395	-----	-----
	Agg. actinomycetemcomitans serotype b str. S23A	443544851	-----	-----
	Agg. actinomycetemcomitans serotype b str. SCC1398	348006394	-----	-----
	Agg. actinomycetemcomitans serotype b str. A160	443550283	-----	-----
	Agg. actinomycetemcomitans Y4	429154918	-----	-----
	Agg. actinomycetemcomitans HK1651	601113024	-----	-----
	Agg. actinomycetemcomitans serotype b str. SCC4092	443547650	-----	-----
	Agg. actinomycetemcomitans serotype c str. SCC2302	348007426	-----	-----
	Agg. actinomycetemcomitans serotype c str. D17P-2	348656671	-----	-----
Aggregatibacter	Agg. actinomycetemcomitans serotype c str. AAS4A	443541805	-----	-----
	Agg. actinomycetemcomitans serotype d str. I63B	347996801	-----	-----
	Agg. actinomycetemcomitans serotype d str. H5P1	347997479	-----	-----
	Agg. actinomycetemcomitans serotype d str. D18P1	348002902	-----	-----
	Agg. actinomycetemcomitans serotype d str. SCC393	348003239	-----	-----
	Agg. actinomycetemcomitans serotype d str. D17P-3	348656236	-----	-----
	Agg. actinomycetemcomitans serotype d str. D7S-1	385876018	-----	-----
	Agg. actinomycetemcomitans D11S-1	261868574	-----Y----	-----
	Aggregatibacter aphrophilus NJ	251794002	-----	--A-----R-----
	Aggregatibacter aphrophilus ATCC 33389	347813475	-----	--A-----R-----
	Aggregatibacter aphrophilus NJ8700	247535401	-----	--A-----R-----
	Aggregatibacter aphrophilus F0387	353345600	-----	--A-----R-----
	Aggregatibacter segnis	493770776	-----	--A-----R-----
	Aggregatibacter segnis ATCC 33393	315476479	-----	--A-----R-----
	Haemophilus sp. oral taxon 851	497182424	-----E G	-SA-----R-----
	Haemophilus aegyptius	494053515	-----E G	-SA-----R-----
	Haemophilus influenzae 86-028N	68249552	-----E G	-SA-----R-----
	Haemophilus parainfluenzae T3T	345428924	-----E D	NSSQ-----RD-----
	Haemophilus haemolyticus	491853634	-----E G	-SD-----R-----
	Haemophilus pittmaniae	494452657	-----T D	-AEQ-GQ--HQ-----
	Avibacterium paragallinarum	516416005	-----S D	NAEQ-----R-----
	Haemophilus somnus 129PT	113460561	-----S--Y--T D	NIE-----RQ-----
	Haemophilus somnus 2336	170718908	-----S--Y--T D	NIE-----RQ-----
	Pasteurella pneumotropica	517167578	-----E D	NSEQ-----R-----
	Pasteurella dagmatis	492150466	-----S-H D	NSAQ-E---R--L---
	Pasteurella multocida subsp. m	15603525	-----H D	HSSQ--I--RH-L---
Others Pasteurellales	Pasteurella bettyae	492138635	-----S-----S D	-A---SE--RS-----
	Actinobacillus succinogenes	501021160	-----Q-ADCT D	NAAQGV--RQ-----
	Mannheimia succiniciproducens	52425810	-----S-Q-----A D	-VQ---A--RA-----
	Mannheimia haemolytica USDA-AR	472332644	--V--S-S-IAK-KE L	TEIQRGHE-Q-----
	Bibersteinia trehalosi USDA-AR	470166263	-----A-S-IAKQKT L	SDEQRIQQ-KQ-----
	Actinobacillus capsulatus	517482124	--V--S-S-IAKKKE I	-E-QR--E-QG-V---
	Actinobacillus pleuropneumonia	491797892	--V--S-S-IAKKKE I	-E-QR--E-QG-----
	Actinobacillus ureae	491836958	--V--S-S-IAKKKE I	-EAQR--E-QG-----
	Actinobacillus suis H91-0380	407693304	--V--S-S-IAKKKE I	-DAQR--E-QG-----
	Actinobacillus minor	492353241	--V---S-IAKKK- I	-DNQRK-E-QS-----
	Haemophilus parasuis SH0165	219871503	-----S-S-IAKQK- L	TEEQRKFN-EQ-----
	Haemophilus ducreyi 35000HP	33152962	--V--N-S-ITKKA L	NEEQR-IA-KQ-L---
	Haemophilus paraphrohaemolytic	491988454	--V---SKI AKQKE L	NETERKTQ-QT-----
	Haemophilus paraahaemolyticus	491985107	--V---SKI AKQKA L	NETARQAQ-QT-----
	Haemophilus sputorum	494790245	--V---SKI AKQK- L	AETQRRE--Q--L---

Supplementary Figure 15

A 1 aa deletion in a conserved region of the Multidrug Transporter MurJ protein, specific *Aggregatibacter* is shown in the figure.

			372	412
	(Agg. Actinomycetemcomitans D7S-1	387120244	GSLVSLSEFTAFGALSGKITGG	S SMTIEGKIAQWVYVSLYR
	Agg. Actinomycetemcomitans HK1651	601112307	-----	-----
	Agg. Actinomycetemcomitans D17P-3	348655454	-----	-----
	Agg. Actinomycetemcomitans Y4	429152231	-----	-----
	Agg. Actinomycetemcomitans RhAA1	359757161	-----	-----
	Agg. Actinomycetemcomitans ANH9381	365967736	-----	-----
	Agg. Actinomycetemcomitans D11S-1	261867944	-----	-----
Aggregatibacter	Agg. Actinomycetemcomitans erotype e str. SCC393	387120244	-----	-----
	Agg. Actinomycetemcomitans erotype e str. SCC1398	348006243	-----	-----
	Agg. Actinomycetemcomitans erotype e str. AAS4A	443541389	-----	-----
	Agg. Actinomycetemcomitans erotype e str. SCC4092	443547308	-----	-----
	Agg. Actinomycetemcomitans erotype e str. SC1083	347993017	-----	-----
	Agg. Actinomycetemcomitans erotype f str. D18P1	348000420	-----	-----
	Agg. Actinomycetemcomitans erotype d str. I63B	347997013	-----	-----
	Aggregatibacter segnis	493769445	-----G-----	-----M-----
	Haemophilus haemolyticus	491870682	-T----S---L-SI-N-FGKN	PL-VQ--F--FA-----
	Haemophilus sp. oral taxon 851	497182862	-T----S---L-SI-N-FGKN	PL-VQ--F--FA-----
	Haemophilus parainfluenzae T3T	345429510	-T----S---L-SI-N-FGKN	PL-VQ--F--FA-----
Other	Haemophilus influenzae R2846	386266521	-T----N---L-S-TN-FGKN	PL-VQ--F--FA-----
Pasteurellales	Haemophilus influenzae Rd KW20	16272688	-T----N---L-S-TN-FGKN	PL-VQ--F--FA-----
	Haemophilus influenzae 10810	378696947	-T----N---L-S-TN-FGKN	PL-VQ--F--FA-----
	Haemophilus influenzae F3031	319897753	-T----N---L-S-TN-FGKN	PL-VQ--F--FA-----
	Edwardsiella tarda EIB202	269139415	-----STV-S-M-NL-R-	--M---R--RIM-----
	Citrobacter freundii	489928937	-----N-STV-S-M-NL-R-	--MV--R--RF--I----
	Aliivibrio salmonicida LFI1238	209694845	-----N-STV-S-M-NL-K-	--M---R--RI--I----
	Escherichia coli	485787518	-----N-STV-S-M-NL-R-	--M---R--RF--I----
	Shigella boydii	491148521	-----N-STV-S-M-NL-R-	--M---R--RF--I----
Other	Hahella chejuensis KCTC 2396	83649253	-----RYSTV-N-M-NL--K	--M---R--RF--I----
Gammaproteo-	Photobacterium damsela	491441018	-----R-STV-S-M-NL-K-	--MV--R--RV--I----
bacteria	Brenneria sp. EniD312	496403366	-----K-STV-S-M-NLMS-	-VM---R--RF--I----
0/250	Salmonella enterica subsp. ent	197362727	-----N-STV-S-M-NL-R-	--M---R--RFL-I----
	Cronobacter sakazakii	495164111	-----K-STV-S-M-NLMR-	--M---R--RF--I----
	Serratia sp. M24T3	497321568	-----R-STV-S-M-NL-K-	--M---RL-RM-----
	Vibrio mimicus	491666772	-----R-STV-S-M-NL-R-	--MV--R--RV--I----
	Erythrobacter sp. NAP1	494285496	---I---R-STV-S-M-NLV--	A-AV--R--RFI-T----

Supplementary Figure 16

Partial sequence alignment of NADH dehydrogenase, showing the presence of 1 aa insertion that is specific for *Aggregatibacter*. The homologue of this is protein or the sequence of the region containing insertion is found to be missing in *Aggregatibacter aphrophilus*

			418	473
Mannheimia	Mannheimia haemolytica USDA-AR	472333011	TDDNPRTEQKIMADIVKGFSP	QQI IHNREEAIKTAIEQAKATDVILIAGKGHE
	M. haemolytica USDA-ARS-USMARC-185	472337351	-----	-----
	Mannheimia haemolytica D174	525663559	-----	-----
	Mannheimia haemolytica D171	523431845	-----	-----
	Mannheimia haemolytica PHL213	153094058	-----	-----
	Mannheimia haemolytica M42548	481063369	-----	-----
	Mannheimia haemolytica D193	528878678	-----	-----
	Mannheimia haemolytica USMARC_2286	526469516	-----	-----
	M. haemolytica USDA-ARS-USMARC-185	472261588	-----	-----
	Mannheimia haemolytica M42548	481063369	-----	-----
	Mannheimia haemolytica D153	523447566	-----	-----
	Mannheimia haemolytica D38	528825629	-----	-----
	Mannheimia haemolytica D35	528823205	-----	-----
	Mannheimia haemolytica MhBrain2012	528878382	-----	-----
	Mannheimia haemolytica MhSwine2000	528876521	-----	-----
	M. haemolytica ser. A2 str. OVINE	261308490	-----	-----
	M. haemolytica ser. A2 str. BOVINE	261310843	-----	-----
	M. haemolytica ser. 6 str. H23	452086134	-----	-----
	M. varigena USDA-ARS-USMARC-1312	575446106	-----	-----A-T-Q-----
	M. varigena USDA-ARS-USMARC-1296	575444080	-----	-----A-T-Q-----
	M. varigena USDA-ARS-USMARC-1388	575446833	-----	-----A-T-Q-----
	M. haemolytica ser. A1/A6 str. PKL10	589591032	-----ES- TA	-----D-----
	M. varigena USDA-ARS-USMARC-1261	575440375	-----ENQ SA	-----V-----SI-----
	Mannheimia granulomatis	652755953	-----N-----	-----QT V-----S-----
	Haemophilus aegyptius	494054439	-K-----SQSQ-ET--A--KNM	EK VG--PD-AQ--QF--S-VEN-----
	Haemophilus pittmaniae	494451972	-M-----PI--E--LA-VGDR	NT VAL-T--QD--EF-VGG-IEE-----
	Pasteurella pneumotropica	517168269	-T-----PD--E--A--DM	DK VGL-SD-AQ--EF--QS-QKN-L-----
	Actinobacillus capsulatus	517480314	-----T-----L--VQV	EK V-V--D--Q--S--G-K-----
	Haemophilus influenzae	543952514	-K-----SQNQ-E--A--KNM	EK VG--PD-AQ--QF--S-VEN-----
	Haemophilus sp. oral taxon 851	497452628	-K-----SQSQ-ES--A--KNM	DK VG--PD--Q--QF--S-VEN-----
	Gallibacterium anatis	332288557	-----AAA-IN--Q-LDF-	NN AT--Q-KQ-LVY-FAC-N-N--V-----
	Haemophilus haemolyticus	491854538	-K-----SQSQ-E--A--KNM	DK VG--PD--Q--QF--S-VEN-----
	Avibacterium paragallinarum	523673909	-----PAA--Q--QA--ENV	DK VA--Q-DF--RY-LSL-QPR--V-----
	Bibersteinia trehalosi USDA-AR	470166531	-----PDV-F--MQ--H--	KA V-TM-I-QY--EQ--SPK--V-----
	Haemophilus parasuis SH0165	219870386	-----PDV-FN-VM--R--	KA V-SM-I-QY--EQ--A--EPK-----
	Haemophilus paraphrohaemolytic	491991723	-----L--ENV	GV V-V--D--Q--L--PQ-----
	Haemophilus parahaemolyticus	491987869	-----V-L--ENV	DV V-V--D--Q--T-L--PQ-----
	Haemophilus sputorum	494790980	-----L--ENV	GI V-V--D--Q--L--PQ-----
Other Pasteurellales	Haemophilus ducreyi 35000HP	33151486	-N-----OH--V-E-MQ--A--	DN ILV-YD--Q--OH--KH-SSA-L-----
	Actinobacillus suis H91-0380	407693013	-----T-----L--VQV	EK V-V--D--Q--G-K-----
	Actinobacillus pleuropneumonia	491794283	-----A--L--VQV	EK V-V--D--Q--NEK-----
	Actinobacillus ureae	491831120	-----T--N-L--VQV	EK V-V--D--Q--NEK-----
	Actinobacillus minor	492350031	-----PDV-FN--M--R--	KA V-SM-I-QY--EQ--A--EPK-----
	Actinobacillus succinogenes 13	152979591	-----PE--V--TA--ARL	KN V--A--A--CA--QS-AEN-----
	Mannheimia succiniciproducens	52425727	-----RHQ-VQ--A--KR-	ES VN-VYD--Q--R--VQS-VEN-----
	Pasteurella bettyae	492145494	-----HH--Q--V--KQ-	EQ IKV--D--Q--VQS-VEN-----
	Pasteurella dagmatis	492155823	-----AAE--Q--LL--EDQ	SA VK-L-D--Q--AF--DPE-T-----
	Pasteurella multocida subsp. m	383310768	-----SAAQ-VQ--LA--EH-	QH VEVC-A-DQ--IQ-LQK-DSD--V-----
	Pasteurella multocida 36950	378774794	-----SAAQ-VQ--LA--EH-	QH VEVC-A-DQ--IQ-LQK-DSD--V-----
	Aggregatibacter segnis	493768749	-----HTQ--L--IH-	QA V-V--Q--A--QS-VEN-----
	Aggregatibacter aphrophilus NJ	251792018	-----HTQ--L--IN-	QA V-V--Q--A--KS-VEN-----
	Aggregatibacter actinomycetemc	491744776	-N----M-EPT-----LT--VH-	QR V-V--Q--Q--A--KS-VEN-----
	Haemophilus somnus 129PT	113460499	-----NPEQ--Q--LT--QQS	SA V--Q--Q--LQS-VEN--V-----
Other Gammaproteobacteria 0/250	Haemophilus somnus 2336	170718778	-----NPEQ--Q--LT--QQS	SA V--Q--Q--LQS-VEN--V-----
	Haemophilus parainfluenzae T3T	345429820	-Q-----PN--E--LT--RM	ED VGV-PD-----FT--N-VEN--V-----
	Thiomicrospira crunogena XCL-2	78484908	-----LPDA-V--K--MHRS	--VHV-V-D-P--AF--KK-SSH-IVV-----
	Cellvibrio japonicus Ueda107	192360758	-N----S--PAR-A--R-LNN-	NG CLVLAD-AQ--DF-VQ--PG-LV-----
	Francisella philomiragia	490415713	-E--N-F-SIES-FD--K--H-	DK HTF-DS-----YT--NS--N--L-----
	Vibrio mimicus	491665840	-----S-SP-A-V--MLA-LTH-	EL AH-E--FQ-ASY-LQN-G-Q-I--L-----
	Rahnella sp. Y9602	322834425	-----S-EPRA-V--LA-LLDA	GR V-E--G-A--VTS--M--ED--V-----
	Aeromonas veronii	491498935	-----EPAR-----M-A-LRD-	AA V-VE-D-VK--VL-TG--SKQ-I--V-----
	Pseudomonas sp. GM84	495372865	-----P-G-F--RP--A--	AD VDFVAG-GQ--AQL-AS-A-D--VL-----
	Cronobacter universalis	494980781	-----PKA-I--LT-MLDA	GR ARVVEG-A--VTN--M--AEN--V-L-----
	Dickeya zeae Ech1591	251788245	-----S--P-A-VT--LS-LLDA	GR V-V-AG-A--VTS-VM--A-D--V-V-----
	Xanthomonas campestris pv. cam	21230195	-----G--GDV-V--LR--AR-	DA AIVQRD-AA--HQ--SM-G-D-IV-----
	Hafnia alvei	490196006	-----S-EPRS-----LN-MLDA	GH A-A-SG-A--VTG--M--PD--V-----
	Vibrio sp. HENC-03	497393525	-----S--PAL--K-MLA-LT--	AE AIVQ-D-FK-LSY-L-H-SSQ-I--L-----
	Salmonella enterica	486331335	-----EPRA-IN--LA-MLDA	GQ VRVMEG-A--VTN--M--DN--V-----

Supplementary Figure 17

Partial sequence alignment for UDP-N-acetylmuramoylalanine-D-glutamate--2,6-diaminopimelate ligase. The protein contains 2 aa deletion that is specific for *Mannheimia* is shown in the figure. *Mannheimia haemolytica* ser. A1/A6 str. PKL10 and *Mannheimia varigena* USDA-ARS-USMARC-1261 lacks this insert.

			504	531
<i>Mannheimia</i>	Mannheimia haemolytica USDA-AR	472333189	RTYDRQSAVDLVK	K HHVDYHIRETFESA
	Mannheimia haemolytica D174	525663396	-----	-----
	Mannheimia haemolytica D171	523431632	-----	-----
	Mannheimia haemolytica D153	525702078	-----	-----
	Mannheimia haemolytica D35	528823164	-----	-----
	Mannheimia haemolytica USMARC_2286	526469350	-----	-----
	Mannheimia haemolytica D38	528826710	-----	-----
	Mannheimia haemolytica D193	528879592	-----	-----
	Mannheimia haemolytica USMARC_2286	526469350	-----	-----
	Mannheimia haemolytica M42548	482887395	-----	-----
	M. haemolytica USDA-ARS-USMARC-185	472261405	-----	-----
	M. haemolytica serotype 6 str. H23	452085964	-----	-----
	M. haemolytica M42548	481065996	-----	-----
	M. haemolytica serotype A1/ A6 str. PKL10	589590286	-----	-----
	M. haemolytica serotype A2 str. OVINE	261307780	-----	-----
<i>Other Pasteurellales</i>	Mannheimia granulomatis	652757696	-----A-----	-----YV-----
	Bibersteinia trehalosi USDA-AR	470167741	----R--K-L-	Q-I-FQV-----
	Haemophilus parasuis SH0165	219871186	-S---FNT-N-I-	----QV-----
	Haemophilus ducreyi 35000HP	33151802	----Y--IQ-T-	L---FQ-----
	Haemophilus sputorum	494789674	-----TT-G-I-	QD-NFIV-----
	Haemophilus parahaemolyticus	491988280	-----TT-S-I-	QD--FIV-----
	Haemophilus paraphrohaemolytic	491992094	-----TT-S-I-	QD--FIV-----
	Actinobacillus suis H91-0380	407691804	----H--IE-T-	R---FQ-----
	Actinobacillus ureae	491835981	----H--IE-T-	L---FQT-----
	Actinobacillus pleuropneumonia	491785098	----H--IE-T-	L---FQ---L---
	Haemophilus pittmaniae	494450521	----RT--E-I-	YD--FIV-----
	Haemophilus parainfluenzae T3T	345429902	----RTT-N-I-	QD--FIV-----
	Haemophilus sp. oral taxon 851	497182364	----KTT-S-I-	QD--FIV-----
	Haemophilus influenzae 86-028N	68249497	----KTT-S-I-	QD--FIV-----
	Acinetobacter junii	491093379	-S---EHS LH---	-N--M-----
<i>Other Gammaproteobacteria</i> 0/250	Acinetobacter ursingii	491131668	-S---EHS L---	KD--Q-----
	Xanthomonas sacchari	498028753	-S---EH-LE-IA	AG-----
	Acinetobacter sp. CIP 70.18	491344899	-S---EHS LY---	-K--M-----
	Pseudomonas mendocina	489337704	-AF--EH-LE---	-DA--IV-----
	Pseudomonas stutzeri ATCC 1758	339494315	-AF--EH-LE---	-DA--IV-----
	Pseudoxanthomonas spadix BD-a5	357417720	-SF--EH-LQ---	AG--Q-----
	Xanthomonas axonopodis pv. cit	21243026	-S---HSLQ--A	AG--Q-----
	Xanthomonas campestris pv. ves	78048045	-S---HSLQ--A	AG--Q-----
	Pseudomonas putida KT2440	26990029	-AF--EH-LE---	-DA--IV-----S
	Serratia plymuthica	493362897	-AH--EH-IE-I-	AN--QV-V-----
	Alcanivorax pacificus	496012633	-A---RH-LT-IR	DD--FLV-----

Supplementary Figure 18

Partial sequence alignment for Glutathione-regulated potassium-efflux system protein is shown in figure. The protein contains 1 aa insertion that is specific for *Mannheimia*.

		214	252
<i>Mannheimia</i>	Mannheimia haemolytica USDA-AR	472334521	FNKILNSEVIQAAIAEEAKKS
	Mannheimia haemolytica D35	528823843	-----
	Mannheimia haemolytica D193	528871831	-----
	Mannheimia haemolytica M42548	482885978	-----
	Mannheimia haemolytica D174	525664688	-----
	Mannheimia haemolytica D171	525657694	-----
	Mannheimia haemolytica D153	525703384	-----
	Mannheimia haemolytica USMARC_2286	526468127	-----
	Mannheimia haemolytica PHL213	153094325	-----
	Mannheimia haemolytica D38	528824437	-----
	M. haemolytica Ser. A1/ A6 str. PKL10	589590824	-----
	M. haemolytica ser. A2 str. BOVINE	261310643	-----
	M. haemolytica ser. 6 str. H23	452086460	-----
	M. haemolytica USDA-ARS-USMARC-183	472258758	-----
	M. haemolytica USDA-ARS-USMARC-185	472260218	-----
	M. haemolytica MhSwine2000	528873636	-----
	M. haemolytica MhBrain2012	528877526	-----
	M. varigena USDA-ARS-USMARC-183	472334521	-----
	M. varigena USDA-ARS-USMARC-185	472335981	-----
	M. varigena USDA-ARS-USMARC-1261	575441602	-----
	M. varigena USDA-ARS-USMARC-1312	575445157	-----
	M. varigena USDA-ARS-USMARC-1388	575447863	-----
	M. varigena USDA-ARS-USMARC-1296	575443019	-----L-----H-----
	Mannheimia granulomatis	652756314	-----
Other <i>Pasteurellales</i>	Haemophilus ducreyi	33151743	-D-LIQLPT-VQ--ED---TK KI PIP---Q-----LD----
	Avibacterium paragallinarum	516417625	---L-QLPT-LK--ED---SK KI PL---H---Y---LD----
	Actinobacillus capsulatus	517482099	L--LIQLPT-VQ--ED---SK KI -K---QQ-----LD----
	Pasteurella pneumotropica	517166617	---L-Q-AP-----DD---SK NI -R---Q---Y---LD----
	Bibersteinia trehalosi USDA-AR	470167473	---L-Q-PA-L---ED---P KS -----MD----
	Haemophilus parasuis SH0165	219870296	---L-Q-PA-L---ED---P KS -L-----LD----
	Haemophilus sputorum	494789007	---L-D-AALKK---D--ENK KI -----Q-----LE----
	Haemophilus parahaemolyticus	491986948	---L-D---LKK---D--ENK KI PL----A--T-MLD----
	Haemophilus paraphrohaemolytic	491989884	---L-D-D-LKK---D--ENK KI PL----A--A-MLD----
	Actinobacillus minor	492357411	---L-D---LKK---D--ESK KI -----Q-----L-----
	Actinobacillus pleuropneumonia	190150433	---IQ-PA-K---E---TK KI -I---Q-----V-----
	Actinobacillus ureae	491831417	---LIQLSA-VQ--ED---SK KI -K---QQ-----LD----
	Actinobacillus suis H91-0380	407692764	---LIQLPA-VQ--ED---SK KI -K---QQ-----LD----
	Actinobacillus succinogenes 13	152979421	---L-QHPAVLQ--ED--RGK NM TK-----L-----
	Mannheimia succiniciproducens	52306852	---L-Q-P--LS---D---SK NM -R-R-HQ-----LK----
	Pasteurella bettyae	492142581	---L-Q-P--LE---D---SK NM -QAR--Q-----LK----
	Pasteurella dagmatis	492155126	---L-V-SA-LD--KD--AK NI -E---TQ--K--LE----
	Pasteurella multocida subsp. m	383311863	---L-V-PT-LD--QD--AK NI -E---TQ--K--LD----
	Gallibacterium anatis UMN179	332288840	-A-L--N-K-IK---D--ENK KI -----Q-----LQ----
	Aggregatibacter actinomycetemc	365966896	---L-QQP--L--ED---SK SI -V-----LD----
	Aggregatibacter segnis	493768272	---L-QLP--L--ED---SK NI -R---H-----LD----
	Haemophilus somnus 129PT	113460531	---L-Q-PA-LN---D---SK RI -K-----Y---LD----
	Haemophilus aegyptius	494053302	---L-Q--A-RR--ED---SK NI -I---Q---Y---LD----
	Haemophilus influenzae 10810	378696948	---L-Q--A-RR--ED---SK NI -I---Q---Y---LD----
	Haemophilus influenzae F3047	319775311	---L-Q--A-RR--ED---SK NI -I---Q---Y---LD----
Other <i>Gammaproteo-</i> <i>bacteria</i> 0/250	Morganella morganii subsp. mor	455737880	---L-K-KA-EK-VED--AK KI TI---QNVSM--V--
	Xenorhabdus nematophila	498913621	-K-L-A-KA-EK---D-VRSK KI --D--KQN-INMLE----
	Brenneria sp. EniD312	496405590	---L---KA-KK--DD--RSK KL -H-R-QQN-IALME----
	Rahnella sp. Y9602	322834784	---L-A-KA-EK--ED--RSK KI -H---QQN-IALME----
	Sodalis glossinidius str. 'mor	85060120	---L-A-KA-EK-VED--RSK KI -V---QQN-IELME----
	Alteromonas macleodii str. 'Bl	407701965	-SV-G-DAVRR-----SRSK KV -H---KET-QSY-T----
	Hafnia alvei	490196787	---L-S-KA-EK-VED--RSK KI -R---QQN-VALME----
	Yersinia enterocolitica subsp.	386310208	-K-L-T-KA-EK-V-D--RTK KI -H---QQN-ITLME----
	Vibrio parahaemolyticus	491619082	-KRLMK--A-EQ--LD--NSK DI PI-----HA-MD----
	Escherichia coli	485767479	---L-A-RA-AK-VED--RSK KI -H---QQN-IALME----
	Salmonella enterica	486386721	---L-A-KA-AR-VED--RSK KI -H---QQN-IALME----
	Shimwellia blattae DSM 4481 =	387890936	---L-A-KA-AK-VED--RSK KI -H---QQN-VALME----

Supplementary Figure 19

A 2 aa deletion in a partial sequence alignment of the Glycerol-3-phosphate acyltransferase protein specific for *Mannheimia* is depicted in the figure.