Table S7. Allocation of mutational SNPs to lineages by virtual outgroup analysis

ExPEC Cluster										Outgroup Strains[g]																						
UTI89[a]	UTI89 site[b]	APEC 01[a]	APEC 01 site[b]	S88[a]	S88 site[b]	type[c]	Inferred ancestral base[d]	Lineage inferred to mutate[e]	Support level[f]	CFT073	ED1a	536	E2348/69	SMS 3-5	IAI39	UMN026	K-12	ATCC 8739	HS	D1 Sd197	CB9615	Sakai	EDL933	IAI1	E24377A	SE11	SS Ss046	F2a 301	F2a 2457T	F5 8401	B4 Sb227	B18 BS512
c	5137	a	5118	c	5137	nc	c	APEC	++++	t	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	6015	g	5996	g	6015	ns	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	6101	a	6082	a	6101	ns	g	AS	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
t	7680	c	7661	c	7680	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	31180	a	31161	g	31180	s	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
1	31384	1	31375	-	31393	del	1	S88	++++	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
g	37126	a	37107	a	37125	s	a	UTI89	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a		
g	39520	g	39501	t	39519	ns	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g		
g	39698	a	39679	g	39697	s	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g		
c	47451	t	47432	c	47450	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c		
a	56555	g	56536	g	56554	s	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	58886	t	58867	c	58885	s	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	62785	t	62766	c	62784	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	66012	t	65993	c	66011	s	c	APEC	++	c	c	c	c	c	c	c	t	t	c	c	c	c	c	c	c	c	c	c	c	c	t	t
a	67549	c	67530	c	67548	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	73331	a	73312	c	73330	nc	c	APEC	+++	c	c	c		c	c																	
1	73814	-	73794	1	73813	del	1	APEC	+++	-	1	1		1	1																	
-	74177	1	74167	1	74186	del	1	UTI89	+++	1	1	1		1	1																	
c	75007	t	74988	t	75007	nc	c	AS	++++	c	c	c		c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	76814	t	76795	c	76814	s	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
a	91573	t	91554	t	91573	nc	t	UTI89	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
t	91574	a	91555	a	91574	nc	a	UTI89	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
c	92784	a	92765	a	92784	s	c	AS	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	97682	t	97663	c	97682	s	t	S88	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
c	104328	a	104309	c	104328	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	109023	c	109004	t	109023	ns	c	S88	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	113567	c	113548	c	113567	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	t	c	c	c	c	c	c	c
a	117905	a	117886	g	117905	ns	a	S88	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
c	121009	c	120990	t	121009	ns	c	S88	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
a	123914	g	123895	a	123914	nc	a	APEC	++	a	a	a	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	125858	g	125839	a	125858	ns	g	S88	+++	g	g	g		g																		
t	126442	g	126423	t	126442	ns	t	APEC	+++	c	t	t		t																		
c	127904	t	127885	c	127904	nc	c	APEC	+++	c	c	c		c																		
1	133986	-	133966	-	133985	del	1	AS	++++	1	1	1	1	1	1	1				1	1	1	1									
4	140774	-	140753	4	140773	del	4	APEC	++++	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
c	154677	c	154653	t	154676	ns	c	S88	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	160807	t	160783	c	160806	ns	c	APEC	++	c	c	c	c	c	c	t	c	g			t	t	t	c	c	c	c				c	
c	161029	t	161005	t	161028	s	c	AS	++++	c	c	c	c	c	c	c	c							c	c	c	c				c	
g	164019	c	163995	c	164018	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
a	170166	g	170142	g	170165	s	a	AS	++	a	a	a	a	a	a	g	a	g	g	a	a	a	a	a	a	a	a	a	a	a	a	a
a	181047	a	181023	t	181046	s	a	S88	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
c	183903	c	183879	t	183902	s	c	S88	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	184354	a	184330	g	184353	s	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
t	204768	g	204744	t	204767	ns	t	APEC	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
a	209338	g	209314	g	209337	s	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	211483	t	211459	g	211482	s	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	216204	g	216180	a	216203	ns	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
t	216887	c	216863	c	216886	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	219539	t	219515	g	219538	ns	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	221104	c	221080	t	221103	ns	c	S88	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
a	228460	t	228436	a	228459	nc	a	APEC	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
a	228470	c	228446	a	228469	nc	a	APEC	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
c	228613	a	228589	c	228612	nc	a	APEC	-	a	c	a	c	c	t	c	c	c	c	c	c	c	c	c	c	c	t	c	t	t	a	t
c	228660	t	228636	c	228659	nc	t	APEC	-	t	c	t	c	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
a	228733	c	228709	c	228732	nc	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	228787	a	228763	a	228786	nc	a	UTI89	++	a	a	a	a	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
a	229776	g	229752	g	229775	s	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	231135	c	231107	c	231134	nc	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	232332	c	232305	c	232331	nc	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
-	232828	1	232804	-	232827	ins	-	APEC	++++	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	232846	1	232823	-	232845	ins	-	APEC	++++	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	232895	1	232873	-	232894	ins	-	APEC	++++	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	232914	1	232893	-	232913	ins	-	APEC	++++	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
c	233419	c	233398	a	233418	ns	a	S88	-	a	a	a	a	a	g	a	c	a	c	a	g	g	g	a	g	a	a	a	a	a	g	g
1	233433	-	233411	-	233431	ins	-	UTI89	++	-	-	-	1	-	-	1	1	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-
-	233431	-	233418	1	233439	ins	-	S88	++	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	1	1
t	239048	g	239026	g	239047	ns	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	239547	t	239525	t	239546	s	c	AS	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	241946	t	241924	g	241945	nc	t	S88	++	t	t	t	t	t	t	t	t	t	t	g	t	t	t	t	t	t	g	t	t	t	t	g
a	243191	g	243169	g	243190	nc	a	AS	++		a	a				a																
a	244032	a	244010	c	244031	ns	a	S88	++++		a	a				a			a		a	a	a	a	a	a	a					
g	245731	a	245709	g	245730	ns	g	APEC	++++		g	g				g			g		g	g	g	g	g	g	g					
t	249444	t	249422	g	249443	ns	t	S88	++++		t	t				t			t		t	t	t	t	t	t	t					
c	250473	c	250451	t	250472	ns	c	S88	++++		c	c				c			c		c	c	c	c	c	c	c					
g	253202	g	253180	a	253201	ns	g	S88	++++		g	g				g			g		g	g	g	g	g	g	g					
c	260627	c	260605	a	260626	ns	c	S88	++		c	c				c																
t	263285	t	263263	c	263284	nc	t	S88	++		t	t				g																
a	263318	g	263296	g	263317	nc	a	AS	++		a	a				a																
g	266663	a	266641	g	266662	ns	g	APEC	++			g																				
a	268514	t	268492	a	268513	ns	a	APEC	++			a																				
-	276793	1	276772	-	276792	ins	-	APEC	++++	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
c	278807	g	278786	g	278806	ns	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g				g	g

ExPEC Cluster										Outgroup Strains[g]																						
UTI89[a]	UTI89 site[b]	APEC 01[a]	APEC 01 site[b]	S88[a]	S88 site[b]	type[c]	Inferred ancestral base[d]	Lineage inferred to mutate[e]	Support level[f]	CFT073	ED1a	536	E2348/69	SMS 3-5	IAI39	UMN026	K-12	ATCC 8739	HS	D1 Sd197	CB9615	Sakai	EDL933	IAI1	E24377A	SE11	SS Ss046	F2a 301	F2a 2457T	F5 8401	B4 Sb227	B18 BS512
c	280815	t	280794	t	280814	ns	c	AS	++++	c	c	c	c	c	c	c	c	c	c		c	c	c	c	c	c	c	c	c	c		
c	309874	t	311464	t	299239	nc	c	AS	++	c		c																				
1	310009	-	311598	-	299373	ins	-	UTI89	++	-		-																				
g	311554	g	313143	a	300918	nc	g	S88	++	g		g																				
a	313568	c	315157	a	302932	nc	a	APEC	++++	a		a	a	a	a	a	a	a			a	a	a	a	a	a						
c	320771	c	322360	g	310135	ns	c	S88	++++	c	c	c	c	c	c	c	c	c			c	c	c	c	c	c					c	
t	320925	c	322514	c	310289	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c			c	c	c	c	c	c					c	
-	321246	1	322845	1	310620	del	1	UTI89	++++	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1					-	
a	322177	g	323767	a	311542	nc	a	APEC	++	a	a	a	a	a		a	g	g	g		a	a	a	g	g	g					g	
a	324320	g	325910	a	313685	s	a	APEC	++++	a	a	a	a	a	a	a	a	a	a		a	a	a	a	a	a					a	
c	328733	c	330323	t	318098	nc	c	S88	+++	c		c	c	c	c	c																
g	329587	a	331177	a	318952	s	g	AS	+++	g		g	g	g	g	g																
c	332304	t	333894	t	321669	s	c	AS	++	c		c	c	c	c	c		t	c		c	c	c	c	t	c						
t	336518	c	338108	c	325883	nc	t	AS	++++	t		t	t	t	t	t	t	t	t		t	t	t	t	t	t	t					c
a	339541	g	341131	g	328906	ns	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g		g	g	g	a	g	g	g					
-	342481	1	344072	-	331846	ins	-	APEC	++++	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-		-
t	342623	c	344214	c	331988	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c		c	c	c	c	c	c	c	c	c	c		c
-	344595	1	346196	1	333970	del	1	UTI89	++++	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1		1	1	1		1
a	349665	g	351257	a	339031	nc	a	APEC	+++	a		a							a		a	a	a			a						
-	350806	-	352407	1	340182	ins	-	S88	++	-		-							-		1	1	1			-						
g	357087	t	358679	t	346454	s	g	AS	++++	g		g	g	g	g	g	g	g	g		g	g	g	g	g	g			g			
c	363910	t	365502	t	353277	s	c	AS	++	c	c	c	c	t	t	c	c	c	c		c	c	c	c	c	c	c					
a	364638	g	366230	g	354005	s	a	AS	++++	a	a	a	a	a	a	a	a	a	a		a	a	a	a	a	a	a					
g	366733	a	368325	g	356100	ns	g	APEC	++++	g	g	g	g	g	g	g	g	g	g		g	g	g	g	g	g	g					
a	367643	a	369235	c	357010	ns	a	S88	++++	a	a	a	a	a	a	a	a	a	a		a	a	a	a	a	a	a					
t	377150	c	378742	c	366517	nc	c	UTI89	++	c	c	c	c	c	a	a	c	c	c		c	c	c	c	c	c						
a	378067	g	379659	g	367434	nc	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g		g	g	g	g	g	g						
c	386225	c	387817	t	375592	s	c	S88	++++	c	c	c	c	c	c	c	c	c	c		c	c	c	c	c	c						
c	386235	t	387827	t	375602	s	t	UTI89	++++	t	t	t	t	t	t	t	t	t	t		t	t	t	t	t	t						
t	389340	a	390932	t	378707	ns	t	APEC	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t					
-	392256	1	393849	-	381623	ins	-	APEC	++++	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
c	395358	t	396951	c	384725	s	c	APEC	++	c	c	c	c	c	c	c	c	a	a		c	c	c	a	a	a	a					a
g	398289	a	399882	a	387656	ns	g	AS	++++	g	g	g		g	g	g	g	g	g					g	g	g	g					g
a	399075	g	400668	g	388442	ns	g	UTI89	++++	g	g	g		g	g	g	g	g	g					g	g	g	g					g
5	400318	-	401910	5	389685	del	5	APEC	++++	5	5	5		5	5	5	5	5	5					5	5	5	5					5
c	405375	a	406963	c	394742	nc	c	APEC	++	c		c	c	t	t	t	t	t	t	c	c	c	c	t	t	t	t	t	t	t	t	t
c	407688	t	409276	c	397055	s	c	APEC	++++	c		c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c				c	c
1	415505	1	417103	-	404881	del	-	S88	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
c	416081	t	417669	c	405447	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	419774	g	421362	a	409140	s	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
t	423277	a	424865	t	412643	nc	t	APEC	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
-	424186	1	425775	-	413552	ins	-	APEC	++++	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
g	425766	g	427355	c	415132	ns	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	430783	t	432372	c	420149	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	432469	c	434058	c	421835	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	432619	t	434208	c	421985	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	433304	t	434893	t	422670	s	t	UTI89	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
c	437960	a	439549	c	427326	s	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	t	c	c	c	c	c	c	c	c	c	c	c	c
c	440108	g	441697	c	429474	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	442626	c	444215	c	431992	s	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	454656	t	456245	c	444022	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	456678	c	458267	c	446044	s	c	UTI89	++	c	c	c	c	c	c	c	t	t	t	c	c	c	c	t	t	t	t	t	t	t	t	t
-	464820	-	466418	9	454196	ins	-	S88	++++	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-
-	464829	9	466419	9	454205	ins	-	AS	++	9	-	-	9	-	-	-	-	-	-		-	9	9	-	-	-	-	9	9	9	9	9
g	473065	a	474663	a	462449	s	g	AS	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
t	473288	g	474886	g	462672	ns	t	AS	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
c	482361	t	483959	t	471745	nc	c	AS	++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	t	c	c	c	c	c	c	t	t
g	483535	a	485133	g	472919	ns	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	491700	a	493298	g	481084	s	g	APEC	++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	a	a	a	g	g
c	493493	t	495091	t	482877	nc	c	AS	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
a	497146	g	498744	g	486530	s	a	AS	++	a	a	a	a	g	g	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
g	512232	a	513830	a	501616	ns	g	AS	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	512366	t	513964	c	501750	s	c	APEC	++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	a	a	a	t	c
g	525865	g	527463	a	515249	s	g	S88	++++	g	g	g	g	g		g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	528387	c	529985	t	517771	s	c	S88	++++	c	c	c	c	c		c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	531399	t	532997	c	520783	ns	c	APEC	+				c	c	c	c					c	c	c									
g	531800	g	533398	t	521184	nc	g	S88	+				g	g	g	g				g	g	g	g									
t	533757	t	535355	c	523141	ns	t	S88	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
a	535190	g	536788	g	524574	s	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	538955	t	540553	t	528339	ns	g	AS	++++	g	g	g	g	g		g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	539309	a	540907	a	528693	ns	g	AS	++++	g	g	g	g	g		g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	539322	t	540920	t	528706	ns	c	AS	++++	c	c	c	c	c		c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	543064	c	544662	c	532448	nc	c	UTI89	++++	c	c	c	c	c		c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	549601	t	551199	t	538985	s	c	AS	++	c	c	c	c	t		c	t	t	t		c	c	c	t	t	c						
1	572059	-	573656	1	612093	del	1	APEC	++++	1	1	1	1		1	1	1				1	1	1			1						
-	572205	1	573803	-	612239	ins	-	APEC	++	-	1	-	-		-	1	1									-						
t	576235	g	577833	g	616269	ns	g	UTI89	++++	g	g	g	g	g	g	g	g	g		g	g	g	g	g	g	g	g	g	g	g		
t	576251	c	577849	c	616285	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c		c	c	c	c	c	c	c	c	c	c	c		
c	584611	a	586209	c	624645	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c		c	c	c	c	c	c	c	c	c	c	c	c
t	586944	c	588542	c	626978	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	586974	g	588572	t	627008	ns	t	APEC	++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	g	g
g	591673	t	593271	t	631707	nc	t	UTI89	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t

ExPEC Cluster										Outgroup Strains[g]																						
UTI89[a]	UTI89 site[b]	APEC 01[a]	APEC 01 site[b]	S88[a]	S88 site[b]	type[c]	Inferred ancestral base[d]	Lineage inferred to mutate[e]	Support level[f]	CFT073	ED1a	536	E2348/69	SMS 3-5	IAI39	UMN026	K-12	ATCC 8739	HS	D1 Sd197	CB9615	Sakai	EDL933	IAI1	E24377A	SE11	SS Ss046	F2a 301	F2a 2457T	F5 8401	B4 Sb227	B18 BS512
c	594656	t	596254	c	634690	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	595701	a	597299	a	635735	ns	c	AS	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	604433	a	606031	a	644467	ns	a	UTI89	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
g	607313	a	608911	a	647347	ns	g	AS	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
a	608801	g	610399	a	648835	ns	a	APEC	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
1	617802	1	619410	-	657845	del	1	S88	++++	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
g	617910	a	619508	a	657943	ns	g	AS	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	620352	a	621950	a	660385	ns	a	UTI89	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
g	620584	g	622182	c	660617	ns	g	S88	++	g	g	g	g	g	a	g	a	a	a	a	a	a	a	a	a	a		a	a	a	a	a
-	625135	1	626734	-	665168	ins	-	APEC	++++	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
a	633552	a	635151	t	673585	ns	a	S88	++++	a	a	a	a	a	a	a	a	a	a		a	a	a	a	a	a	a	a	a	a	a	a
c	636819	t	638418	c	676852	s	c	APEC	++++	c	c	c	c	c	t	c	c	c	c		c	c	c	c	c	c	c	c	c	c	c	c
g	638264	a	639863	g	678297	ns	g	APEC	++++	g	g	g	g	g	g	g	g	g	g		g	g	g	g	g	g	g	g	g	g	g	g
c	638644	t	640243	t	678677	nc	t	UTI89	++++	t	t	t		t	t	t	t	t	t		t	t	t	t	t	t		t	t	t	t	t
-	646999	1	648599	-	687032	ins	-	APEC	++++	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
c	648209	t	649809	c	688242	s	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	650006	c	651606	a	690039	s	c	S88	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	659858	c	661458	c	699891	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
a	661947	g	663547	g	701980	nc	a	AS	++++	a	a	a	a					a	a					a	a	a	a				a	a
g	662705	g	664305	a	702738	ns	g	S88	++++	g	g	g	g					g	g					g	g	g	g				g	g
c	663960	t	665560	t	703993	ns	c	AS	++++	c	c	c	c					c	c					c	c	c	c					c
c	666692	t	668292	c	706725	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	670946	t	672546	t	710979	s	c	AS	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
1	680891	1	682501	-	720933	del	1	S88	++	1		1	1																			
c	682623	t	684223	t	722655	ns	t	UTI89	++	t		t	t																			
c	687798	t	689398	c	727830	s	c	APEC	++	c		c	c																			
a	699915	g	701515	a	739947	ns	a	APEC	++++	a	a	a	a	a	a		a	a			a	a	a	a	a	a	a	a	a	a	a	
t	703110	c	704710	c	743142	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
a	712215	g	713815	g	752247	ns	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	714992	t	716592	t	755024	nc	t	UTI89	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
a	726044	a	727644	g	766076	nc	a	S88	++++	a	a	a	a			a	a			a	a	a	a				a	a	a	a	a	a
t	730657	a	732257	t	770689	s	t	APEC	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
t	731269	g	732869	t	771301	s	t	APEC	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
g	734812	a	736412	g	774844	nc	g	APEC	++	g	g	g	a	a	a	a				a	a	a	a									
c	739894	t	741494	c	779926	s	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	745093	t	746693	c	785125	nc	t	S88	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
c	749029	t	750629	c	789061	s	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	a	c	c	c	c	c	c	c	c	c	c	c	c
g	750117	a	751717	g	790149	s	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
a	752334	t	753934	a	792366	s	a	APEC	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
g	766017	g	767617	a	806049	ns	g	S88	++++	g	g	g	g	g		g	g	g	g		g	g	g	g	g	g		g	g	g		g
-	772403	1	774004	-	812435	ins	-	APEC	++++	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
c	772836	a	774437	a	812868	s	c	AS	++	c	c	c	c	t	c	t	c	c	c	c	t	t	t	c	c	c	c	c	c	c	c	c
t	779702	c	781303	c	819734	nc	c	UTI89	++++	c	c	c	c	c	c	t	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	779797	t	781398	t	819829	nc	c	AS	++	c	c	c	t	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	t	c	c	c
t	786791	c	788392	c	826823	s	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	787318	t	788919	c	827350	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	787666	t	789267	c	827698	s	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
a	792683	c	794284	c	832715	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	795077	t	796678	c	835109	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c				c	c
c	795188	c	796789	t	835220	ns	c	S88	++++	c	c	c	c	c		c	c	c	c					c	c	c	c				c	c
t	799830	c	801431	c	839862	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	803061	t	804662	c	843093	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	804050	c	805651	g	844082	ns	c	S88	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	806581	c	808182	c	846613	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	807561	t	809162	g	847593	ns	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
a	810780	c	812381	c	850812	ns	c	UTI89	++	c	c	c	c	t	t	t	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	810812	t	812413	t	850844	ns	c	AS	++++	c	c	c	g	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
a	819100	g	820701	a	859132	s	a	APEC	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
c	829836	t	831437	c	869868	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	830341	c	831942	t	870373	ns	t	APEC	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
-	831313	1	832915	-	871345	ins	-	APEC	++++	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
t	834112	c	835714	t	874144	nc	t	APEC	++++	t	t	t	t	t	t	t	t	t	t		t	t	t	t	t	t	t	t	t	t	t	t
g	835947	a	837549	a	875979	s	a	UTI89	++++	a	a	a	a	a	a	a	a	a	a		a	a	a	a	a	a	a	a	a	a		a
c	843239	t	844841	t	883271	ns	t	UTI89	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
c	849611	t	851213	t	889643	s	c	AS	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	856209	c	857811	t	896241	ns	c	S88	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	860894	t	862496	t	900926	ns	t	UTI89	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
1	861711	1	863323	-	901752	del	1	S88	++	1	1	1	1	1	1	1	-	1	1	1	1	1	1	1	-	1	1	1	1	1	1	1
1	865313	-	866914	-	905343	del	1	AS	++++	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
t	867819	t	869420	a	907849	ns	t	S88	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
g	874804	a	876405	a	914834	nc	a	UTI89	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
a	877547	t	879148	a	917577	ns	a	APEC	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
a	887400	g	888821	g	927250	ns	g	UTI89	++		g																					
a	898073	g	899494	g	937923	ns	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
a	899916	t	901337	t	939766	ns	t	UTI89	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
g	902707	t	904128	g	942557	nc	g	APEC	++++	g	g	g	g	t	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	905103	a	906524	a	944953	ns	a	UTI89	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
c	964418	t	963391	t	966974	s	c	AS	++	c	c	c	c	c	c	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
t	965722	c	964695	c	968278	s	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	970013	t	968986	c	972569	s	c	APEC	++	c	c	c	c	c	c	c	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
5	970685	-	969657	5	973241	del	5	APEC	++++	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
1	970847	-	969814	1	973403	del	1	APEC	++++	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

ExPEC Cluster										Outgroup Strains[g]																						
UTI89[a]	UTI89 site[b]	APEC 01[a]	APEC 01 site[b]	S88[a]	S88 site[b]	type[c]	Inferred ancestral base[d]	Lineage inferred to mutate[e]	Support level[f]	CFT073	ED1a	536	E2348/69	SMS 3-5	IAI39	UMN026	K-12	ATCC 8739	HS	D1 Sd197	CB9615	Sakai	EDL933	IAI1	E24377A	SE11	SS Ss046	F2a 301	F2a 2457T	F5 8401	B4 Sb227	B18 BS512
g	975980	a	974947	g	978536	ns	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	977458	c	976425	t	980014	ns	c	S88	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	978577	c	977544	c	981133	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	980226	c	979193	t	982782	ns	c	S88	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	997585	c	996552	a	1000141	nc	c	S88	++++	c		c	c			c								c	c	c	c	c	c	c		
t	1001866	c	1000833	c	1004422	s	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
a	1005106	g	1004073	a	1007662	nc	a	APEC	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
c	1008991	t	1007958	t	1011547	s	c	AS	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
a	1009299	a	1008266	g	1011855	nc	a	S88	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
g	1017505	g	1016472	a	1020061	nc	g	S88	++	g	g	g	g	g	g	g	g	a	g	a	g	g	g	g	g	g	g	g	g	g	g	g
g	1023013	g	1021980	a	1025569	ns	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	1023423	t	1022390	t	1025979	s	t	UTI89	++	c	t	c	g	t	c	c	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
t	1027187	c	1026154	c	1029743	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
1	1027219	1	1026196	-	1029784	del	1	S88	++++	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
t	1036972	c	1035939	t	1039527	ns	t	APEC	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
10	1046266	-	1045232	-	1048820	del	10	AS	++	10	10	10	-	-	10	10	-	-	-	-	-	-	-	-	-	-	-	10	10	10	-	-
c	1050612	t	1049569	t	1053157	s	c	AS	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	1070356	t	1069313	c	1072901	s	c	APEC	++++	c	c	c	c	c	c	c	c	c	c		c	c	c	c	c	c	c	c	c	c	c	
c	1071203	t	1070160	t	1073748	ns	c	AS	++++	c	c	c	c	c	c	c	c	c	c		c	c	c	c	c	c	c	c	c	c	c	
c	1071431	t	1070388	t	1073976	nc	t	UTI89	++++	t	t	t	t	t	t	t	t	t	t		t	t	t	t	t	t	t	t	t	t	t	
c	1077313	c	1076270	a	1079858	ns	c	S88	++++	c		c			c		c	c	c		c	c	c		c	c			c			
c	1077646	t	1076603	t	1080191	ns	c	AS	++++	c		c			c		c	c	c		c	c	c		c	c			c			
t	1158594	c	1095982	c	1099570	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c				c	c
g	1171909	t	1109297	t	1112885	ns	t	UTI89	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
c	1176227	t	1113615	c	1117203	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	1179442	c	1116830	t	1120418	ns	c	S88	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	1182008	t	1119396	c	1122984	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
a	1189065	g	1126453	g	1130041	s	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
a	1197653	g	1135041	g	1138629	ns	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	1206608	g	1143996	a	1147584	ns	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	1209196	t	1146584	c	1150172	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	1213900	g	1151288	g	1154876	nc	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
a	1214628	g	1152016	g	1155604	s	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
a	1214712	g	1152100	a	1155688	s	a	APEC	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
t	1217161	c	1154549	t	1158137	ns	t	APEC	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
c	1232787	t	1170175	c	1173763	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	1235068	a	1172456	a	1176044	s	g	AS	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	1236103	g	1173491	a	1177079	s	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	1242049	t	1179437	t	1183025	s	c	AS	+++	c		c			c	c						c	c									
g	1247499	t	1184887	t	1188475	nc	t	UTI89	++	t											t								t			
1	1251028	-	1188415	1	1192004	del	1	APEC	++	1			-								-	1										
13	1252153	13	1189540	-	1193074	del	13	S88	+++	13	13		13			13					13	13	13									
c	1256059	t	1193446	t	1196968	s	t	UTI89	++++	t		t				t	t				t			t	t	t	t					
c	1257897	t	1195284	t	1198806	nc	c	AS	++	c		c				t	t				t			c	c	c	t	t	t	t		
1	1261320	-	1198616	1	1202229	del	1	APEC	+++	1		1			1	1					1	1										1
1	1261370	-	1198665	-	1202278	ins	-	UTI89	+++	-		-			-						1	-										-
a	1261667	c	1198962	c	1202575	ns	a	AS	+++	a		a	a		a						a	a										c
a	1265584	t	1202879	t	1206492	s	t	UTI89	+	t	a		t		a	a					t	a	a			a		a	a	a		a
t	1265659	c	1202954	c	1206567	s	c	UTI89	+	t	c		c		c	c					t	c	c			c		c	c	c		c
t	1268419	c	1205714	t	1209327	ns	c	APEC	-	t	c		c		c	t					t					c		c	c	c		c
g	1271732	a	1209027	g	1212640	ns	g	APEC	++++	g	g	g	g		g	g		g			g	g	g	g		g	g					g
g	1274273	a	1211568	a	1215181	s	a	UTI89	++	a	g	a	g		a	a		a			g	a	g	a		g	a					a
c	1275306	c	1212601	t	1216214	ns	c	S88	+	c	g	t	t	c	c	c		t			c	t	g	t		t	t	c	c	c	c	c
c	1278400	t	1215695	c	1219308	s	c	APEC	++	c	t	c	c	g	c	c		c	c		c	c	c	c		c	c	t	t	t	t	g
-	1279719	1	1217015	-	1220627	ins	-	APEC	++++	-	-	-	-	-	-	-		-	-		-	-	-	-		-	-	-	-	-	-	-
c	1285383	t	1222679	t	1226291	ns	t	UTI89	++	t	t	t		c	t	t				c							c	c	c	c	c	c
t	1285420	c	1222716	c	1226328	s	t	AS	++	t	t	t		c	t	t				c							c	c	c	c	c	c
a	1285687	g	1222983	g	1226595	ns	a	AS	++++	a	a	a		g	a	a				a							a	a	a	a	a	a
t	1285689	c	1222985	c	1226597	ns	t	AS	++++	t	t	t		c	t	t				t							t	t	t	t	t	t
t	1287152	g	1224448	t	1228060	ns	t	APEC	++	t					t	t																
t	1290845	c	1228141	c	1231753	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c		c			c	c	c	c					c
c	1299167	c	1237575	t	1241187	ns	c	S88	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	1304124	t	1242532	c	1246144	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	1309829	t	1248237	t	1251849	s	c	AS	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	1317484	c	1255892	c	1259504	s	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c		c	c	c	c	c
a	1318229	c	1256637	c	1260249	s	c	UTI89	++++	c	c	c	c	c	c	c				c	c	c	c					c	c	c		
c	1318870	t	1257278	c	1260890	ns	c	APEC	++++	c	c	c	c	c	c	c				c	c	c	c					c	c	c		
c	1325784	t	1264192	c	1267804	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c		c	c	c	c	c
c	1328119	c	1266527	a	1270139	ns	c	S88	++++	c	c	c	c	c	c	c	c	c	c		c	c	c	c	c	c		c	c	c	c	c
c	1329839	c	1268247	t	1271859	ns	c	S88	++++	c	c	c	c	c	c	c	c	c	c		c			c	c	c		c	c	c	c	c
g	1334663	a	1273071	g	1276683	s	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	t	g	g	g	g	g	g
c	1335889	a	1274297	a	1277909	ns	a	UTI89	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
c	1336581	t	1274989	c	1278601	s	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	1339622	a	1278030	g	1281642	ns	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	1343179	c	1281587	t	1285199	s	c	S88	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	1344099	t	1282507	t	1286119	s	t	UTI89	++	t	t	t	t	t	t	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	1345497	a	1283905	g	1287517	ns	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	1346113	g	1284521	a	1288133	s	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
a	1346192	a	1284600	g	1288212	nc	a	S88	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
g	1347609	a	1286017	a	1289629	ns	g	AS	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	1348340	c	1286748	g	1290360	ns	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
t	1351411	c	1289819	c	1293431	s	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c

ExPEC Cluster										Outgroup Strains[g]																						
UTI89[a]	UTI89 site[b]	APEC 01[a]	APEC 01 site[b]	S88[a]	S88 site[b]	type[c]	Inferred ancestral base[d]	Lineage inferred to mutate[e]	Support level[f]	CFT073	ED1a	536	E2348/69	SMS 3-5	IAI39	UMN026	K-12	ATCC 8739	HS	D1 Sd197	CB9615	Sakai	EDL933	IAI1	E24377A	SE11	SS Ss046	F2a 301	F2a 2457T	F5 8401	B4 Sb227	B18 BS512
c	1351918	c	1290326	t	1293938	s	c	S88	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	t
t	1356504	t	1294912	c	1298524	ns	t	S88	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
a	1356862	g	1295270	g	1298882	s	g	UTI89	++	g	g	g	g	g	g	g	a	a	a	a	a	a	a	a	a	a	a	g	g	g	a	a
c	1362182	t	1300590	c	1304202	nc	c	APEC	++++	c	c	c		c		c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	1383331	g	1321739	g	1325351	ns	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	1383687	t	1322095	t	1325707	s	c	AS	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
a	1396233	c	1334641	a	1338253	ns	a	APEC	+	-	a											a	a				a				a	
12	1396238	-	1334645	12	1338258	del	12	APEC	++	-	12											12	12				12				12	
c	1397119	a	1335515	a	1339139	ns	c	AS	++++	c	c		c		c	c		c			c			c	c	c	c				c	c
t	1397449	c	1335845	c	1339469	ns	?	UTI89/AS	+/-																							
-	1407410	1	1345332	1	1349440	ins	-	AS	++++	-	-		-	-	-	-	-	-	-	-	-	-	-	-				-	-	-	-	-
-	1409852	1	1347766	-	1351873	ins	-	APEC	++	-		-			-	1	1	1			1	-	1	1	1	1	1					-
c	1411572	t	1349486	c	1353593	s	c	APEC	+	t	c	a	c		c	c		a			t	c	c	a	a	t	a	c	c	c		c
g	1411629	t	1349543	t	1353650	s	g	AS	++	g	g	g	g		g	g		g			g	g	g	g	g	t	g	a	a	a		t
g	1411639	t	1349553	t	1353660	ns	g	AS	++	g	g	g	g		g	g		g			g	g	g	g	g	t	g	g	g	g		t
1	1411898	1	1349822	-	1353928	del	1	S88	++++	1	1	1	1		1	1		1			1	1	1	1	1	1	1	1	1	1		1
t	1414911	a	1352825	a	1356931	ns	a	UTI89	++	a	a		t		a	a					t	t	t			a		a	a	a		t
t	1415527	c	1353441	t	1357547	s	t	APEC	++	t	t		t		t	t					t	t	t			t		c	c	c		t
t	1416046	g	1353960	g	1358066	s	g	UTI89	++	g	g		g		g	t					g	g	g			g		g	g	g		t
g	1419751	g	1357665	a	1361762	ns	g	S88	++++	g	g	g	g		g	g		g			g	g	g	g		g	g					g
g	1419789	t	1357703	t	1361800	ns	t	UTI89	++	t	t	c	c		t	t		t			c	t	t	c		t	c					t
t	1422681	c	1360595	c	1364692	s	t	AS	++	t	g	t	t		t	t		t			g	g	g	t		t	t					t
c	1423327	c	1361241	a	1365338	ns	c	S88	++++	c	c	c	c		c	c		c			c	c	c	c		c	c					c
c	1423914	g	1361828	c	1365925	ns	c	APEC	++	c	c	c	c	t	c	c		c			c	a	a	c		c	c	c	c	c	c	c
a	1426400	g	1364314	g	1368411	s	g	UTI89	++++	g	g	g	g	g	g	g		g			g	g	g	g		g	g	g	g	g	g	a
a	1426526	g	1364440	g	1368537	s	a	AS	++	a	g	a	g	g	g	g		g			g	g	g	g		g	g	g	g	g	g	a
t	1426565	g	1364479	g	1368576	s	t	AS	++	t	c	t	c	g	t	g		g			t	c	c	t		g	t	t	t	t	t	t
c	1426574	t	1364488	t	1368585	s	c	AS	++	t	c	c	c	t	c	c		t			c	c	c	c		c	c	c	c	c	c	c
a	1426637	g	1364551	g	1368648	s	a	AS	++	a	c	a	c	a	a	a		a			a	c	c	a		a	a	a	a	a	a	a
g	1429230	g	1367144	a	1371241	ns	g	S88	++++	g	g		g	g	g	g		g	g		g	g	g	g		g	g	g	g	g	g	g
g	1447820	t	1385734	g	1389831	ns	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	1453371	a	1391285	g	1395382	s	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	1454280	g	1392194	a	1396291	s	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	1458464	c	1396378	t	1400475	s	c	S88	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	1462538	g	1400452	g	1404549	ns	c	AS	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
-	1462662	1	1400586	1	1404683	del	1	UTI89	++++	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
c	1463574	t	1401489	c	1405586	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	1464840	a	1402755	a	1406852	ns	a	UTI89	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
g	1465094	a	1403009	a	1407106	s	g	AS	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
-	1467769	1	1405685	-	1409781	ins	-	APEC	++	-	-	-	1	1	-	1	1	-	1	1	1	1	1	1	-	1	-	-	-	-	1	1
a	1468756	g	1406672	g	1410768	ns	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	1472422	t	1410338	t	1414434	ns	c	AS	++++	c	c	c	c	c	c						c	c	c									
a	1473133	g	1411049	g	1415145	s	g	UTI89	++++	g	g	g	g	g	g						g	g	g									
a	1474417	g	1412333	a	1416429	ns	a	APEC	++++	a	a	a	a	a	a					a	a	a	a									
g	1477730	t	1415646	t	1419742	ns	g	AS	++	g	g	g	g	g	g					a	a	a	a									
g	1484184	t	1422100	t	1426196	ns	g	AS	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	1485942	g	1423858	a	1427954	nc	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	1487497	g	1425413	a	1429509	s	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	1494997	t	1432913	t	1437009	ns	c	AS	++++	c	c	c	c	c	c		c	c	c		c	c	c	c	c	c	c	c	c	c		
g	1496430	t	1434346	t	1438442	s	g	AS	++	g	g	g	g	g	g		g	g	g		g	g	g	g	g	g	g	a	a	a		
t	1500217	c	1438133	c	1442229	ns	c	UTI89	++++	c	c	c	c	c	c		c	c	c		c	c	c	c	c	c	c	c	c	c		
t	1501794	c	1439710	c	1443806	ns	t	AS	++++	t	t	t	t	t	t		t	t	t		t	t	t	t	t	t	t	t	t	t		t
g	1504398	a	1442314	a	1446410	ns	a	UTI89	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
t	1508902	c	1446818	c	1450914	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
1	1519257	-	1457172	1	1461269	del	1	APEC	++++	1	1	1	1							1								1	1	1		
g	1521868	a	1459783	a	1463880	ns	g	AS	+++		g	g	g															g	g	g		
a	1538087	g	1528329	g	1480099	nc	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
a	1541057	g	1531299	a	1483069	ns	a	APEC	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
g	1544148	-	1534072	t	1486160	ns	t	UTI89	++	t	t	t																				
c	1550029	c	1538948	a	1492041	s	a	S88	-	a	c	a		c	c	t	g	g	g		g	g	g									
c	1550527	a	1539446	a	1492539	ns	c	AS	++++	c	c	c		c	c	c	t	c	c		c	c	c									
c	1552364	a	1541283	a	1494376	ns	a	UTI89	++	a		a																				
a	1554726	g	1543645	a	1496738	ns	a	APEC	++++	a		a		a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
a	1555817	a	1544736	g	1497829	s	a	S88	++++	a		a		a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
t	1570842	c	1559761	c	1512854	s	c	UTI89	++++	c	c	c	c	c		c	c	c	c	c	c	c	c	c	c	c	t	c	c	c	c	c
c	1575287	a	1564206	a	1517299	ns	a	UTI89	++++	a	a	a	a	a		a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
a	1578748	c	1567667	c	1520760	ns	a	AS	++++	a	a	a	a	a		a	a	a	a	a	a	a	a	a	a	a	a					
c	1584726	c	1573645	t	1526738	ns	c	S88	++++	c	c	c	c	c		c	c	c	c	c	c	c	c	c	c	c	c					
g	1588277	g	1577196	t	1530289	ns	g	S88	++++	g	g	g	g	g		g	g	g		g	g	g	g	g	g	g	g	g	g	g	g	g
g	1590601	g	1579520	a	1532613	ns	g	S88	++++	g	g	g	g	g		g	g	g	g	g	g	g	g	g	g	g	g				g	g
t	1594231	c	1583150	c	1536243	ns	c	UTI89	++++	c	c	c	c	c		c	c	c	c	c	c	c	c	c	c	c	c				c	c
1	1601057	-	1589975	-	1543068	del	1	AS	+++	1	1	1				1																
c	1611629	t	1600547	c	1553640	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
a	1619057	t	1607975	a	1561068	ns	a	APEC	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
c	1624073	t	1612991	c	1566084	nc	c	APEC	+++	c	c	c	c																			
g	1627270	a	1616188	a	1569281	s	g	AS	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	1628087	a	1617005	g	1570098	ns	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
a	1635824	a	1624742	g	1577835	ns	a	S88	++++	a		a	a	a	a	a	a	a	a		a	a	a	a	a	a	a	a	a	a	a	a
g	1640268	t	1629186	g	1582279	s	g	APEC	++++	g	g	g	g	g	g	g	g	g	g		g	g	g	g	g	g	g	g	g	g	g	
t	1643287	c	1632205	c	1585298	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	1645178	c	1634096	a	1587189	ns	c	S88	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	1646225	t	1635143	c	1588236	nc	t	S88	++++	t	t	t	t	t	t	-	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t

ExPEC Cluster										Outgroup Strains[g]																						
UTI89[a]	UTI89 site[b]	APEC 01[a]	APEC 01 site[b]	S88[a]	S88 site[b]	type[c]	Inferred ancestral base[d]	Lineage inferred to mutate[e]	Support level[f]	CFT073	ED1a	536	E2348/69	SMS 3-5	IAI39	UMN026	K-12	ATCC 8739	HS	D1 Sd197	CB9615	Sakai	EDL933	IAI1	E24377A	SE11	SS Ss046	F2a 301	F2a 2457T	F5 8401	B4 Sb227	B18 BS512
c	1647470	t	1636388	-	1588975	nc	c	APEC	++++	c			c		c	c	c	c	c		c	c	c	c	c	c	c					
a	1647836	g	1638650	-	1588975	ns	g	UTI89	++++	g			g	g		g					g	g	g	g	g	g						
t	1648653	c	1639467	-	1588975	ns	t	APEC	++++	t			t	t		t					t	t	t	t	t	t						
t	1648718	c	1639532	-	1588975	ns	c	UTI89	++++	c			c	c		c					c	c	c	c	c	c						
c	1652927	g	1643741	c	1590946	nc	c	APEC	++	c		c																				
c	1664424	t	1645651	c	1592856	nc	c	APEC	++	c		c	c																			
c	1664436	c	1645663	a	1592868	nc	c	S88	++	c		c	c																			
c	1664699	a	1645926	c	1593131	ns	c	APEC	++++	c		c	c	c	c	c	c	c	c	c	c	c	c	c	c	c		c	c	c		c
t	1664807	a	1646034	t	1593239	ns	t	APEC	++++	t		t	t	t	t	t	t	t	t	t	t	t	t	t	t	t		t	t	t		t
g	1666384	g	1647611	a	1594816	nc	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g		g
c	1666390	t	1647617	t	1594822	nc	t	UTI89	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t		t
c	1680794	c	1662021	t	1609226	ns	c	S88	+++	c				c	c				c					c	c	c						
a	1683458	c	1664685	c	1611890	ns	a	AS	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a		a	a	a		
a	1683785	g	1665012	g	1612217	ns	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g		g	g	g		
c	1684103	t	1665330	t	1612535	ns	c	AS	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c		c	c	c		
t	1692892	g	1674119	t	1621324	ns	t	APEC	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
g	1692976	a	1674203	a	1621408	nc	g	AS	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g		g	g	g	g	g
t	1695714	g	1676941	g	1624146	nc	g	UTI89	++	g	g	g	g	g	g	g	a	a	a	g	g	g	g	a	g	a		g	g	g		
t	1696400	c	1677627	t	1624832	s	t	APEC	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t		t	t	t		
t	1697022	c	1678249	c	1625454	s	c	UTI89	++	c	c	c	c	c	c	c	t	t	t	c	c	c	c	t	t	t		c	c	c	c	c
c	1704035	t	1685262	t	1632467	s	c	AS	++++	c	c	t	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
-	1705691	1	1686928	1	1634133	ins	-	AS	++++	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
c	1708228	t	1689456	c	1636661	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	1730334	g	1711562	t	1658767	ns	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	1732984	t	1714212	g	1661417	ns	g	APEC	++	a	g	g	g	a	a	g	g	g	g		g	g	g	g	g	g	g	g	g	g	g	
c	1739534	a	1720762	a	1667967	ns	c	AS	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	1739912	a	1721140	g	1668345	ns	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	1741790	g	1723018	a	1670223	ns	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	1746426	a	1727654	a	1674859	s	g	AS	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	1748153	a	1729381	g	1676586	ns	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	1751902	a	1733130	a	1680335	ns	a	UTI89	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
t	1759335	t	1740563	g	1687768	ns	t	S88	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
1	1761945	-	1743172	1	1690378	del	1	APEC	++++	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
g	1768156	a	1749383	a	1696589	s	a	UTI89	++	a	a	a	a	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	1775636	a	1756863	g	1704069	nc	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
a	1778602	g	1759829	a	1707035	s	a	APEC	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
g	1781707	a	1762934	g	1710140	ns	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	1783839	a	1765066	g	1712272	ns	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	1785512	t	1766739	t	1713945	ns	c	AS	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	1787340	g	1768567	t	1715773	ns	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
t	1794103	c	1775330	c	1722536	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
a	1798374	g	1779601	g	1726807	s	a	AS	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
c	1800257	a	1781484	c	1728690	nc	c	APEC	++++	c	c	c	c	c	c	c	c	c	c		c	c	c	c	c	c	c	c	c	c	c	c
c	1800617	t	1781844	c	1729050	nc	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	1802868	t	1784095	c	1731301	s	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	1804968	g	1786195	a	1733401	ns	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	1806368	t	1787595	c	1734801	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	1809223	a	1790450	c	1737656	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	1812687	a	1793914	a	1741120	ns	a	UTI89	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a					a	a
t	1819916	g	1801143	g	1748349	ns	g	UTI89	++	g	g	g	g	g	g	g	a	a		a	a	a	a	a	a	a	a	a	a	a	a	a
g	1823196	a	1804423	g	1751629	s	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
t	1827729	g	1808956	g	1756162	nc	t	AS	++	t	t	t	t	t	g	t	t	t	g	t	t	t	t	t	t	t	t	g	g	g	g	t
c	1843632	t	1824859	c	1772065	ns	c	APEC	++	c	c	c	c	c	c	c	c	c	c	c	t	t	t	c	c	c	c	c	c	c	c	c
t	1843776	c	1825003	c	1772209	ns	t	AS	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
c	1844646	a	1825873	a	1773079	ns	c	AS	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	1847036	g	1828263	a	1775469	ns	g	S88	++	g	g	g	g	g	g	g	a	a	a	a	a	a	a	g	g	g	g	g	g	g	g	g
c	1847348	c	1828575	t	1775781	ns	c	S88	++++	c	c	c	c	c	c	c	c	c	c		c	c	c	c	c	c	c	c	c	c		
a	1854587	a	1835814	g	1783020	s	a	S88	++++	a	a	a	a	a	a	a	a	a	a		a	a	a	a	a	a	a	a	a	a		
c	1858337	t	1839564	c	1786770	s	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
1	1863003	-	1844229	1	1791436	del	1	APEC	++++	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
g	1872442	g	1853668	a	1800875	ns	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	1879115	t	1860341	t	1807548	s	c	AS	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	1881762	a	1862988	a	1810195	ns	g	AS	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
a	1885568	g	1866794	a	1814001	ns	a	APEC	++++	a	a	a	a	a	a	a	a	a	a		a	a	a	a	a	a		a	a	a		
1	1889056	-	1870281	1	1817489	del	1	APEC	++++	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1		1	1	1		
g	1889829	g	1871054	a	1818262	s	g	S88	++++	g	g	g	g	g	g	g	g	g	g		g	g	g	g	g	g		g	g	g		
g	1891522	g	1872747	a	1819955	ns	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g		g	g	g		
g	1901202	g	1882427	a	1829635	nc	g	S88	++++	g	g	g	g	g	g	g	g	g	g		g	g	g	g	g	g	g				g	g
c	1902531	a	1883756	c	1830964	nc	c	APEC	++	c	c	c	c	c	c	c	t	t	t		c	c	c	t	t	t	t				t	t
t	1902667	t	1883892	c	1831100	ns	t	S88	++++	t	t	t	t	t	t	t	t	t	t		t	t	t	t	t	t	t				t	t
g	1902708	a	1883933	a	1831141	ns	g	AS	++++	g	g	g	g	g	g	g	g	g	g		g	g	g	g	g	g	g				g	g
c	1904928	c	1886153	t	1833361	ns	c	S88	++++	c	c	c	c	c	c	c	c	c	c		c	c	c	c	c	c	c	c		c	c	c
g	1911685	a	1892910	g	1840118	ns	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g				g	g
t	1913372	c	1894597	c	1841805	ns	c	UTI89	+++	c	c	c	c																			
t	1916481	t	1897706	c	1844914	s	t	S88	++++	t	c	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
c	1937418	t	1918643	c	1865851	s	c	APEC	++++	c	c	c	c	c	c	t	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	1943761	g	1924986	t	1872194	ns	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	1945586	a	1926811	a	1874019	ns	c	AS	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	1952288	t	1933513	c	1880721	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	1957518	a	1938743	g	1885951	nc	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	1958928	g	1940153	t	1887361	ns	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	1962154	a	1943379	g	1890587	s	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g

ExPEC Cluster										Outgroup Strains[g]																						
UTI89[a]	UTI89 site[b]	APEC 01[a]	APEC 01 site[b]	S88[a]	S88 site[b]	type[c]	Inferred ancestral base[d]	Lineage inferred to mutate[e]	Support level[f]	CFT073	ED1a	536	E2348/69	SMS 3-5	IAI39	UMN026	K-12	ATCC 8739	HS	D1 Sd197	CB9615	Sakai	EDL933	IAI1	E24377A	SE11	SS Ss046	F2a 301	F2a 2457T	F5 8401	B4 Sb227	B18 BS512
a	1968251	c	1949476	a	1896684	ns	a	APEC	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
-	1972956	1	1954182	-	1901389	ins	-	APEC	++	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
1	1983458	-	1964683	1	1911891	del	1	APEC	++++	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1
a	1984824	g	1966049	g	1913257	nc	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
a	1985538	g	1966763	a	1913971	s	a	APEC	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
c	1989086	c	1970311	t	1917519	ns	c	S88	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c		c	c	c	c	c
t	1992160	g	1973385	g	1920593	ns	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g		g	g	g	g	g	g	g	g	g	g		
-	2015743	1	1996978	1	1944186	del	1	UTI89	++++	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
g	2015758	t	1996984	t	1944192	nc	g	AS	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
t	2017127	t	1998353	g	1945561	ns	t	S88	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
c	2017589	t	1998815	t	1946023	ns	c	AS	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	2028889	c	2010115	t	1957323	s	c	S88	++++	c		c	c	c	c	c	c	c	c	c	c	c	c	c	c	c		c	c	c	c	c
c	2034723	t	2015949	c	1963157	nc	c	APEC	++	c	c	c				c	a				c			t	t	t	c	c	c	c		
c	2034796	t	2016022	c	1963230	nc	c	APEC	++++	c	c	c				c	c				c			c	c	c	c	c	c	c		
-	2040303	1	2021530	-	1968737	ins	-	APEC	++++	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	
g	2041278	g	2022505	a	1969712	ns	g	S88	++++	g	g	g	g	g	g	g	g	g	g		g	g	g	g	g	g	g	g	g	g	g	
c	2042435	t	2023662	c	1970869	s	c	APEC	++++	c	c	c	c	c	c	c	c	c	c		c	c	c	c	c	c	c	c	c	c	c	
g	2042640	a	2023867	g	1971074	ns	g	APEC	++++	g	g	g	g	g	g	g	g	g	g		g	g	g	g	a	g	g	g	g	g	g	
a	2049617	g	2030844	g	1978051	s	g	UTI89	++++	a	g	g	g	g	g	g	g	g	g		g	g	g	g	g	g	g	g	g	g	g	g
5	2049890	5	2031127	-	1978333	del	5	S88	++	5	5	5	5	5	5	5	5	5	5		5	5	5	5	5	5	-	-	-	-	-	5
g	2050425	t	2031652	t	1978854	ns	t	UTI89	++++	t	t	t	t	t	t	t	t	t	t		t	t	t	t	t	t	t	t	t	t	t	t
g	2054234	a	2035461	g	1982663	nc	g	APEC	++	g	g	g	g	g	g	g	g	a	a	a	g	g	g	a	g	g	g	g	g	g	g	g
c	2055661	c	2036888	t	1984090	ns	c	S88	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	2058158	c	2039385	c	1986587	s	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
a	2060140	a	2041367	c	1988569	ns	a	S88	++++	a	a	a	a	a	a	a	a	a			a	a	a	a	a	a	a				a	a
g	2060419	g	2041646	a	1988848	ns	a	S88	-	a	g	a	a		a	g	g	g			g	g	g	g	g							g
1	2061420	-	2042646	1	1989849	del	-	APEC	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-		-
1	2061411	-	2042646	-	1989849	ins	-	UTI89	++++	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-		-
g	2069960	t	2090717	g	1998388	nc	g	APEC	++++	g	g	g			g	g		g										g	g	g	c	g
g	2074868	t	2095625	t	2003296	ns	g	AS	+++	g	g	g			g	g																
a	2080256	g	2101013	g	2008684	s	g	UTI89	+++	g	g	g			g	g																
c	2085418	g	2106175	c	2013846	ns	c	APEC	+++	c	c	c			c	c																
2	2094224	-	2114980	2	2022652	del	2	APEC	+++	2	2	2			2	2																
g	2109392	a	2130146	a	2037819	s	g	AS	++++	g	g	g	g	g	g	g	g	g	g		g	g	g	g	g	g	g	g	g	g	g	g
a	2109607	g	2130361	g	2038034	nc	a	AS	++	a	g	a	g	g	g	g	g	g	g		g	g	g	g	g	g	g	g	g	g	g	g
t	2109879	c	2130633	c	2038306	s	t	AS	++	t	c	t	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
-	2110732	3	2131496	3	2039169	del	3	UTI89	++++	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	-	3	3	3	3	3	3
g	2279775	a	2229281	a	2139199	s	g	AS	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	2281766	a	2231272	a	2141190	s	g	AS	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	2282840	a	2232346	a	2142264	s	g	AS	++	g	g	g	g	g	g	g	g	g	g	a	g	a	a	g	g	g	g	g	g	g	g	g
g	2283782	a	2233288	a	2143206	s	g	AS	++	g	g	g	a	a	a	a	g	g	g	a	a	a	a	g	g	g	a	g	g	g	g	a
g	2284861	a	2234367	a	2144285	s	g	AS	++++	g	g	g	a	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	2284877	a	2234383	a	2144301	s	g	AS	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	2285554	a	2235060	a	2144978	ns	g	AS	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	2287961	a	2237467	a	2147385	ns	g	AS	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	2291758	t	2241264	t	2151182	s	c	AS	++++	c	c	c	c	c	c	c	c	c	c		c	c	c	c	c	c	c	c	c	c	c	c
a	2292182	t	2241688	t	2151606	ns	t	UTI89	++++	t	t	t	t	t	t	t	t	t	t		t	t	t	t	t	t	t	t	t	t	t	t
c	2293329	c	2242835	a	2152753	s	c	S88	++	t	c	t	c	c	c	c	c	c	c		c	t	t	c	c	c	c	c	c	c	c	c
g	2298541	t	2248047	t	2157965	ns	g	AS	++++	g	g	g	g	g	g	g	g	g	g		g	g	g	g	g	g	g	g	g	g	g	g
c	2299628	a	2249134	c	2159052	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	2300902	g	2250408	g	2160326	ns	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
1	2304194	-	2253699	1	2163618	del	1	APEC	++	1	1	1																				
c	2308823	t	2258328	t	2168247	s	c	AS	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	2313552	g	2286328	g	2209375	ns	g	UTI89	++++	g		g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	2314974	c	2287750	t	2210797	ns	c	S88	++++	c		c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	2315277	c	2288053	t	2211100	ns	c	S88	++++	c		c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	2318549	t	2291325	t	2214372	s	t	UTI89	++	t		t	t	g	g	g	a	g	g	a	g	g	g	a	a	g	a	g	g	g	g	g
g	2319019	t	2291795	t	2214842	ns	t	UTI89	++++	t		t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
g	2321900	a	2294676	a	2217723	ns	g	AS	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	2323696	g	2296472	a	2219519	s	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	2333054	a	2305830	a	2228877	nc	a	UTI89	+	-	-	-	a	a	-	-	-	-	-		-	a	a	-	-	-	-	-	a	-		a
-	2333050	1	2305836	1	2228883	ins	-	AS	++++	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-		-
1	2341206	-	2313982	1	2237030	del	1	APEC	++++	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	-	
t	2345837	c	2318613	t	2241661	s	t	APEC	++++	t	t	t	t	t	t	t	t	t	t		t	t	t	t	t	t		t		t	t	
g	2355032	a	2327808	a	2250856	s	g	AS	++	g	g	g	g	g	g	g	a	g	g	g	a	a	a	g	g	g	g	g	g	g	g	g
t	2359972	g	2332748	g	2255796	ns	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
a	2369563	c	2342339	c	2265387	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
1	2369854	1	2342640	-	2265687	del	1	S88	++++	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
g	2372910	a	2345686	g	2268733	ns	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	2378043	a	2350819	g	2273866	s	g	APEC	++++	g	g	g	g	g	g	a	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	2379747	c	2352523	g	2275570	ns	g	APEC	++	g	a	g	g	g	g	g	g	a	a	g	g	g	g	a	g	a	a	a	a	a	a	g
g	2380063	c	2352839	c	2275886	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	2381779	c	2354555	t	2277602	nc	t	APEC	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
g	2385703	g	2358479	c	2281526	ns	g	S88	++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	-	g	-	g	g
11	2388201	-	2360901	11	2284024	del	11	APEC	++++	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
g	2389021	g	2361711	a	2284844	s	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
t	2398148	g	2370838	t	2293971	ns	t	APEC	++++	t	t	t	t	t	t	t	t	t	t		t	t	t	t	t	t	t	t	t	t	t	t
t	2403611	g	2376301	g	2299434	nc	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
a	2408101	g	2380791	g	2303924	s	g	UTI89	++++	g	g	g	g	g	g	a	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	2409158	t	2381848	c	2304981	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	2427434	c	2400124	t	2323257	ns	c	S88	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	2427990	c	2400680	c	2323813	s	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c

ExPEC Cluster										Outgroup Strains[g]																						
UTI89[a]	UTI89 site[b]	APEC 01[a]	APEC 01 site[b]	S88[a]	S88 site[b]	type[c]	Inferred ancestral base[d]	Lineage inferred to mutate[e]	Support level[f]	CFT073	ED1a	536	E2348/69	SMS 3-5	IAI39	UMN026	K-12	ATCC 8739	HS	D1 Sd197	CB9615	Sakai	EDL933	IAI1	E24377A	SE11	SS Ss046	F2a 301	F2a 2457T	F5 8401	B4 Sb227	B18 BS512
a	2430345	g	2403035	g	2326168	s	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
a	2440930	c	2413620	c	2336753	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	2444432	g	2417122	a	2340255	s	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
t	2447839	c	2420529	c	2343662	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	2449542	c	2422232	c	2345365	nc	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	2455337	a	2428027	t	2351160	ns	t	APEC	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
c	2458675	t	2431365	c	2354498	s	c	APEC	++++	c	c	c	c	c	c	c	c	c	c								c					
a	2459593	a	2432283	g	2355416	nc	a	S88	++++	a	a	a	a	a	a	a	a	a	a								a					
c	2462718	t	2435408	c	2358541	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c								c					
g	2464283	a	2436973	a	2360106	ns	a	UTI89	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	
a	2465047	t	2437737	t	2360870	ns	t	UTI89	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	
t	2472015	c	2444705	c	2367838	s	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c		c	c	c	c	c	c	c	c	c	c		
c	2478525	t	2451215	c	2374348	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	2479957	g	2452647	a	2375780	s	g	S88	++	g	g	g	g	g	g	g	a	a	a	g	g	g	g	a	a	a	a	a	a	a		
t	2486813	c	2459503	c	2382636	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	2495295	c	2467985	t	2391118	ns	c	S88	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c				c				c	
g	2499387	c	2472077	g	2395210	s	g	APEC	++++	g	g	g	g	g	g	g	g	g	g		g	g	g	g	g	g	g	g	g	g		
g	2499412	g	2472102	a	2395235	ns	g	S88	++++	g	g	g	g	g	g	g	g	g	g		g	g	g	g	g	g	g	g	g	g		
g	2501780	g	2474470	a	2397603	nc	g	S88	++++	g	g	g	g	g	g	g	g	g	g		g	g	g	g	g	g	g	g	g	g	g	
g	2506961	g	2479651	a	2402784	ns	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	2513997	a	2486687	a	2409820	ns	a	UTI89	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
g	2520004	a	2492694	a	2415827	s	g	AS	++	g	g			g	g		a		a													
c	2520350	c	2493040	t	2416173	ns	c	S88	++++	c	c			c	c	a	c	c	c									c		c		
g	2523083	a	2495773	g	2418906	s	g	APEC	++	g	g	g	g	g	g	g	a	a	a	g	g	g	g	g	a	a	g	g	g	g	g	g
c	2529680	t	2502370	c	2425503	s	c	APEC	++	c	c	c	c	t	t	c	t	t	c	t	c	c	c	c	c	c	c	t	t	t	t	t
g	2536918	a	2509608	g	2432741	s	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
1	2537290	1	2509990	-	2433122	del	1	S88	++++	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
c	2538598	a	2511288	c	2434420	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	2539456	c	2512146	c	2435278	nc	t	AS	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
c	2539472	a	2512162	a	2435294	nc	a	UTI89	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
a	2542370	a	2515060	t	2438192	ns	a	S88	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
t	2544083	c	2516773	t	2439905	ns	t	APEC	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
g	2544642	a	2517332	g	2440464	s	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
t	2546525	c	2519215	t	2442347	s	t	APEC	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
g	2558064	a	2530754	g	2453886	nc	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	2558406	t	2531096	t	2454228	ns	c	AS	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	2559034	g	2531724	c	2454856	nc	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
t	2560145	c	2532835	c	2455967	nc	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	2566551	g	2539241	a	2462373	ns	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	2576669	g	2549359	a	2472491	ns	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	2577824	a	2550514	a	2473646	s	g	AS	++	g	g	g	g	c	c	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	2577950	a	2550640	a	2473772	ns	a	UTI89	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
a	2580563	g	2553253	g	2476385	s	g	UTI89	++	g	g	g	g	g	g	c	c	c	g	c	c	c	c	g	g	g	g	g	g	g	g	g
g	2587809	a	2560499	g	2483631	s	g	APEC	+++	g	g	g		g	g																	
g	2589925	g	2562615	a	2485747	ns	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	2593016	t	2565706	t	2488838	nc	t	UTI89	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
a	2597240	g	2569930	g	2493062	nc	a	AS	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
-	2599715	a	2574151	g	2497248	nc	g	APEC	+						g																	
c	2609921	t	2583147	t	2506244	ns	t	UTI89	+										t									t	t	t		
a	2617087	g	2590313	g	2513410	s	g	UTI89	+										g													
g	2622681	a	2595907	g	2519004	nc	g	APEC	+				g						-										g			
c	2623429	c	2596655	a	2519752	ns	c	S88	++		c		c								c											
t	2629944	c	2603846	t	2526943	nc	c	APEC	-										c		c											
-	2630659	1	2604562	-	2527658	ins	-	APEC	+										-		-											
t	2630681	c	2604584	c	2527680	nc	c	UTI89	+										c		c											
a	2630724	g	2604627	g	2527723	nc	g	UTI89	+										g		g											
a	2630763	a	2604666	g	2527762	ns	a	S88	+										a		g											
a	2630792	c	2604695	c	2527791	s	c	UTI89	+										c		c											
a	2633676	g	2606211	g	2529307	s	a	AS	+				a																			
t	2633712	a	2606247	a	2529343	s	g	UTI89/AS	+/-				g																			
1	2635747	1	2608292	-	2531387	del	?	S88	+/-																							
-	2636859	1	2609404	1	2532499	indel	?	UTI89/AS	+/-																							
-	2637847	1	2610393	1	2533488	del	1	UTI89	+				1				1										1					
c	2638205	a	2610742	a	2533837	s	a	UTI89	++++	a	a	c		a	a		a	a	a													
g	2644591	g	2617128	a	2540223	ns	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	2644802	t	2617339	t	2540434	nc	t	UTI89	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
c	2649184	c	2621721	t	2544816	s	c	S88	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
a	2655229	c	2627766	a	2550861	s	a	APEC	++	a	c	a	a	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	2668786	t	2641323	c	2564418	s	c	APEC	++++	c	c	c	c	c	c	a	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	2673574	c	2646111	c	2569206	s	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	2677456	g	2649993	a	2573088	s	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	2682832	c	2655369	t	2578464	ns	c	S88	++++	c	c	c	c	c	c		c									c						
c	2684105	a	2656642	a	2579737	ns	a	UTI89	++++	a	a	a	a	a	a		a									a						
a	2692136	g	2664673	g	2587768	nc	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
a	2702909	g	2675446	g	2598541	s	g	UTI89	++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	c	c	c	c	c
1	2721896	1	2694443	-	2617537	del	1	S88	++++	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1				1	1
a	2722335	g	2694872	g	2617966	ns	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g		g	g	g	g	g	g	g				g	g
c	2723746	c	2696283	t	2619377	s	c	S88	++++	c	c	c	c	c	c	c	c	c	c		c	c	c	c	c	c	c				c	c
g	2726504	a	2699041	a	2622135	s	g	AS	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	2738418	t	2710955	c	2634049	s	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	t	c	c	c
a	2751430	g	2723967	g	2647061	s	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	2752707	a	2725244	a	2648338	ns	c	AS	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c

ExPEC Cluster										Outgroup Strains[g]																						
UTI89[a]	UTI89 site[b]	APEC 01[a]	APEC 01 site[b]	S88[a]	S88 site[b]	type[c]	Inferred ancestral base[d]	Lineage inferred to mutate[e]	Support level[f]	CFT073	ED1a	536	E2348/69	SMS 3-5	IAI39	UMN026	K-12	ATCC 8739	HS	D1 Sd197	CB9615	Sakai	EDL933	IAI1	E24377A	SE11	SS Ss046	F2a 301	F2a 2457T	F5 8401	B4 Sb227	B18 BS512
a	2753341	g	2725878	g	2648972	ns	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
-	2762640	1	2735178	-	2658271	ins	-	APEC	++++	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
g	2762859	g	2735397	a	2658490	ns	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	2769663	a	2781967	g	2665294	ns	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
a	2775794	g	2788098	g	2671425	s	g	UTI89	++	g	g	g		c	c	g																
a	2777934	c	2790238	a	2673565	ns	a	APEC	+++	a	a	a		a	a	a																
-	2780261	-	2792574	1	2675902	ins	-	S88	+++	-	-	-		-		-																
g	2787629	g	2799960	t	2683288	s	g	S88	++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	a	a	a	a	a	a	g	g
c	2793020	c	2805351	t	2688679	s	c	S88	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	2802982	a	2815313	c	2698641	s	c	APEC	++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	t	c	t	c	t	t	t	c	c
a	2804210	g	2816541	g	2699869	s	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	2807343	a	2819674	g	2703002	s	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
t	2812613	c	2824944	c	2708272	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	2828498	t	2840829	c	2724157	s	t	S88	++	g	t	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
a	2829805	g	2842136	g	2725464	ns	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
-	2837323	1	2849664	1	2732992	ins	-	AS	++++	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
-	2837332	1	2849665	-	2732992	ins	-	APEC	++++	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
c	2838730	c	2851063	t	2734390	ns	c	S88	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	2850761	c	2863094	c	2746421	ns	t	AS	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
t	2852244	c	2864577	c	2747904	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	2863908	c	2876245	c	2759568	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	2867376	g	2879713	g	2763036	ns	g	UTI89	++	g	g	g	a	-	-	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
c	2868366	c	2883292	a	2766612	ns	c	S88	+++		c	c							c					c	c	c						c
c	2870448	a	2885374	a	2768694	ns	a	UTI89	++	a	a	a	a	c	a	a	c	c	c	c	c	a	a	a	a	a	c	c	c	c	c	c
-	2870517	-	2885396	1	2768769	ins	-	S88	++	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	1
6	2870527	-	2885396	6	2768770	del	-	APEC	-	-	-	-	6	-	-	-	-	-	6	-	-	-	-	-	-	-	-	6	6	6	-	-
1	2870533	-	2885396	-	2768775	ins	-	UTI89	++	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	1	1	-	-
c	2875411	Y	2890436	t	2773653	nc	c	AS	++	y	c	c	c	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
1	2875535	-	2890559	-	2773776	ins	-	UTI89	++	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
c	2880020	t	2895044	t	2778261	ns	c	AS	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	2885116	c	2900140	c	2783357	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
-	2889163	1	2904188	-	2787404	ins	-	APEC	++++	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	2889193	1	2904219	-	2787434	ins	-	APEC	++++	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
a	2893261	c	2908287	c	2791502	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
-	2905562	1	2920598	-	2837908	ins	?	APEC	+/-																							
c	2909584	t	2924611	c	2841921	ns	c	APEC	+						c	c	c												c			
-	2925805	-	2940841	1	2858152	ins	?	S88	+/-																							
c	2926306	t	2941333	c	2858644	ns	?	APEC	+/-																							
g	2926461	g	2941488	t	2858799	nc	?	S88	+/-																							
g	2928128	a	2943155	g	2860466	ns	?	APEC	+/-																							
a	2929713	a	2944740	g	2862051	s	a	S88	+	g	a				a	a					a											a
g	2932318	a	2947345	g	2864656	ns	g	APEC	+++		g				t		g				g											g
a	2935734	g	2950761	g	2868072	nc	a	AS	+						a		a														g	g
g	2942184	a	2957211	a	2874522	ns	?	UTI89/AS	+/-																							
c	2943722	c	2958749	t	2876060	nc	c	S88	++++	c	c	c	c	c	c	c	c	c	c		c	c	c	c	c	c	c	c	c	c	c	c
a	2952549	c	2967576	c	2884887	s	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
1	2953755	-	2968781	1	2886093	del	1	APEC	++	1	1	1	1	1	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-
c	2954500	t	2969526	t	2886838	nc	t	UTI89	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
t	2954673	g	2969699	t	2887011	s	t	APEC	++	t	t	t	t	t	t	t	c	c	c	c	c	c	c	t	t	t	c	t	t	t	t	t
g	2967118	a	2982144	g	2899456	ns	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	2967565	g	2982591	a	2899903	ns	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	2968203	t	2983229	t	2900541	s	g	AS	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	2970741	c	2985767	g	2903079	ns	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	2971888	c	2986914	t	2904226	ns	c	S88	++	c			c							c												
-	2976803	1	2991839	1	2909151	ins	-	AS	++	-	-	-	1	-	-		-	-	-		-	-	-		1		1	-	-	-		
2	2976830	-	2991856	-	2909168	del	2	AS	++	-	2	2	-	2	2		2	2	2		2	2	2	-	-		-	2	2	2		
t	2979147	c	2994313	t	2911625	s	t	APEC	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
t	2981026	g	2996192	t	2913504	s	t	APEC	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
c	2993804	t	3008970	c	2926282	s	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
a	2997877	g	3013043	a	2930355	nc	a	APEC	++++			a		a	a	a	a	a	a	a	a	a	a	a	a	a	a		a		a	a
9	3001650	-	3016815	-	2934127	ins	-	UTI89	++++	-	-	-		-						-				-	-		-	-				
c	3003596	c	3018753	a	2936065	ns	c	S88	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c		c		c	c
c	3005526	g	3020683	c	2937995	s	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	3006193	a	3021350	a	2938662	ns	c	AS	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
a	3009573	c	3024730	c	2942042	nc	c	UTI89	++	c	c	c	c	c	c	c	t	t	t	c	t	t	t	t	t	t	c	t	t	t	c	c
g	3015436	t	3030593	t	2947905	ns	g	AS	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
t	3021643	c	3036221	t	2953533	ns	t	APEC	++++	t	t	t	t				t	t	t					t	t	t	t	t	t	t	t	t
g	3030738	t	3045316	t	2962628	ns	t	UTI89	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
g	3034771	a	3049349	g	2966661	s	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	3035957	a	3050535	g	2967847	s	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	3049339	t	3063917	c	2981229	s	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c		c
9	3049410	-	3063924	9	2981300	del	9	APEC	++++	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9		9
a	3052565	g	3067071	a	2984455	ns	a	APEC	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a					
1	3053060	1	3067576	-	2984959	del	1	S88	++	1	1	-	1	-	1	1	1	1	1	-	1	1	1	1	1	1	-					
12	3057750	12	3072266	-	2989648	del	-	S88	-	-	-	-		-		-					-	-	-	-								
a	3057930	g	3072436	g	2989807	ns	g	UTI89	++++	g	g	g		g		g				g	g	g	g	g								
-	3058856	1	3073363	-	2990733	ins	-	APEC	++++	-	-	-		-		-				-	-	-	-	-								
a	3059721	g	3074228	g	2991598	ns	g	UTI89	++++	g	g	g		g		g					g	g	g									
g	3063616	g	3078123	a	2995493	s	g	S88	++	g	g	g	g	g	g	g	a	a	a	g	a	a	a	a	a	a	a	a	a	a	a	a
c	3064439	t	3078946	t	2996316	ns	c	AS	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	3076663	a	3091170	a	3008540	nc	g	AS	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	3077496	g	3092003	a	3009373	s	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g

ExPEC Cluster										Outgroup Strains[g]																						
UTI89[a]	UTI89 site[b]	APEC 01[a]	APEC 01 site[b]	S88[a]	S88 site[b]	type[c]	Inferred ancestral base[d]	Lineage inferred to mutate[e]	Support level[f]	CFT073	ED1a	536	E2348/69	SMS 3-5	IAI39	UMN026	K-12	ATCC 8739	HS	D1 Sd197	CB9615	Sakai	EDL933	IAI1	E24377A	SE11	SS Ss046	F2a 301	F2a 2457T	F5 8401	B4 Sb227	B18 BS512
a	3079264	g	3093771	g	3011141	s	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	3079927	t	3094434	t	3011804	ns	t	UTI89	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
t	3080045	t	3094552	g	3011922	ns	t	S88	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
t	3081153	c	3095660	c	3013030	s	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	3082908	a	3097415	a	3014785	ns	a	UTI89	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
a	3094027	t	3108534	a	3025904	ns	a	APEC	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
t	3098812	a	3113319	a	3030689	ns	a	UTI89	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
t	3104311	c	3118818	t	3036188	ns	t	APEC	++	t		t													t							
c	3105017	g	3119524	g	3036894	ns	g	UTI89	++	g		g													g							
10	3115492	-	3129998	-	3047368	indel	?	UTI89/AS	+/-																							
t	3119787	t	3134284	a	3051654	s	t	S88	++	t		t																				
a	3121450	g	3135947	g	3053317	ns	g	UTI89	++	g		g																				
c	3123594	c	3140677	t	3055461	ns	c	S88	++	c		c																				
a	3129390	g	3146473	a	3061257	nc	a	APEC	++	a		a																				
a	3133250	c	3150333	c	3065117	ns	c	UTI89	+++	c	c	c	c	c																	c	c
c	3133803	t	3150886	t	3065670	s	t	UTI89	+++	t	t	t	t	c																	t	t
-	3137695	3	3154779	-	3069562	ins	3	APEC	-	3	3	3	3	3																	3	3
-	3137689	-	3154781	3	3069563	ins	3	S88	-	3	3	3	3	3																	3	3
-	3137690	9	3154782	9	3069566	del	9	UTI89	+++	9	9	9	9	9																	9	9
t	3139660	c	3156755	c	3071539	ns	c	UTI89	++	c	c	c	c	c	c	c	c	c	c	c	a	a	a	a	c	c	c	c	c	c	c	c
g	3145220	a	3162315	g	3077099	ns	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
t	3149493	a	3166588	a	3081372	nc	t	AS	++	t	t	t	t	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	3155620	a	3172715	g	3087499	s	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
a	3166862	g	3183957	g	3098741	nc	g	UTI89	++	g	g	g	g	g	a	g	g	g	g	g	g	g	g	g	g	g	a	g	g	g	g	g
g	3173049	a	3190144	a	3104928	s	g	AS	++	g	g	g	g	g	g	g	a	a	a		g	g	g	a	g	a	a	g	g	g	a	a
c	3173298	t	3190393	c	3105177	s	c	APEC	++++	c	c	c	c	c	c	c	c	c	c		c	c	c	c	c	c	c	c	c	c	c	c
a	3174760	a	3191855	t	3106639	nc	a	S88	++++	a	a	a	a	a	a	a	a	a	a		a	a	a	a	a	a	a	a	a	a	a	a
g	3188210	t	3205305	g	3120089	ns	g	APEC	++++	g	g	g	g	g	g	g	g	g	g		g	g	g	g	g	g	g				g	
a	3188698	c	3205793	c	3120577	s	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c		c	c	c	c	c	c	c				c	
c	3194119	a	3211214	c	3125998	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c		c	c	c	c	c	c	c				c	
g	3197069	a	3214164	a	3128948	s	g	AS	++++	g	g	g	g	g	g	g	g	g	g		g	g	g	g	g	g	g					
g	3199881	a	3216976	g	3131760	s	g	APEC	++++	g	g	g	g	g	g	g	g	g	g		g	g	g	g	g	g	g					
g	3209368	a	3226463	a	3141247	s	g	AS	++++	g	a	g	g	g	g	g	g	g	g		g	g	g	g	g	g	g					
a	3210038	g	3227133	g	3141917	ns	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g		g	g	g	g	g	g	g	g	g	g	g	
c	3225664	t	3242759	c	3157543	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
a	3229145	c	3246240	c	3161024	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
a	3230093	c	3247188	c	3161972	s	a	AS	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
t	3242026	c	3259121	c	3173905	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	3245947	c	3263042	c	3177826	ns	t	AS	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
t	3248554	g	3265649	g	3180433	s	g	UTI89	++	g	g	g	g	g	g	g				a	g	g	g	a	a	a	a	a	a	a	a	a
c	3279697	t	3296792	c	3211576	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
a	3280580	g	3297675	g	3212459	s	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	3285534	g	3302629	a	3217413	s	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
-	3287997	g	3316787	a	3231571	nc	g	S88	++	g					g	a																
-	3287974	a	3324534	g	3239318	nc	g	APEC	+++	g		g			g	g																
-	3287974	g	3340695	a	3255479	nc	g	S88	++	g																						
-	3287974	a	3342053	g	3256837	nc	g	APEC	++++	g	g	g	g	g	g	g					g	g	g		g		g	g	g	g	g	g
-	3287974	-	3346623	8	3261408	indel	-	S88	++	-																						
-	3287974	a	3346858	g	3261650	nc	a	S88	++	a																						
-	3287974	a	3349782	t	3264574	nc	t	APEC	++	t																						
-	3287974	a	3353196	g	3267988	nc	g	APEC	+++	g	g	g		g	g										g							
-	3287974	g	3353634	a	3268426	nc	g	S88	+++	g	g	g		g	g										g							
1	3287992	-	3360899	-	3275691	del	1	AS	++++	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
g	3288757	t	3361664	g	3276456	nc	t	APEC	-	t	a	g		g		g																
a	3288878	g	3361785	a	3276577	nc	a	APEC	+++	a	a	a		a		a																
g	3288889	g	3361796	a	3276588	nc	a	S88	-	a	a	t		a		a																
t	3289231	g	3362138	t	3276930	ns	t	APEC	+++	t	t	t		t		t																
g	3290356	a	3363263	a	3278055	ns	g	AS	+++	g	g	g		g	g	g																
a	3298631	g	3371538	g	3286330	ns	g	UTI89	+					g	g																	
c	3306687	t	3379594	c	3294386	ns	c	APEC	++++	c	c	c	c	c	c	c	c		c	c	c			c	c	c					c	c
g	3306918	a	3379825	g	3294617	s	g	APEC	++++	g	g	g	g	g	g	g	g		g	g	g			g	g	g					g	g
g	3307800	g	3380707	a	3295499	s	g	S88	++++	g	g	g	g	g	g	g			g	g	g			g	g	g					g	g
a	3307857	c	3380764	a	3295556	s	a	APEC	++	a	a	a	a	g	g	g			a	a	a			a	a	a					a	a
g	3308758	g	3381665	a	3296457	s	g	S88	++++		g	g	g	g	g	g			g	g	g			g	g	g					g	g
g	3315596	t	3388503	g	3303295	ns	g	APEC	++++		g	g	g	g	g	g			g	g	g			g	g	g					g	g
g	3321119	g	3394026	a	3308818	s	g	S88	++++		g	g	g	g	g	g	g		g		g			g	g	g						
g	3321290	g	3394197	a	3308989	s	g	S88	++		g	g	a	g	a	g	g		g		g			g	g	g						
g	3325799	g	3398706	a	3313498	ns	g	S88	++++	g	g	g	g	g	g	g	g	g	g		g			g	g	g		g	g	g		
g	3329095	a	3402002	g	3316794	nc	g	APEC	++++	g	g	g	g	g	g	g	g	g	g		g			g	g	g		g	g	g		
c	3341110	t	3414017	c	3328809	s	c	APEC	++++	c	c	c	c	c	c	c		c	c		c			c	c	c		c		c		
g	3359519	a	3432426	g	3347218	ns	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
t	3363698	t	3436605	a	3351397	s	t	S88	++	t	t	t	t	t	t	t	t	t	t	c	c	c	c	t	t	t	t	c	c	c	t	t
t	3373017	t	3445924	c	3360716	nc	t	S88	+++	t	t	t	t	t																		
c	3373447	a	3446354	a	3361146	ns	a	UTI89	+++	a	a	a	a	a																		
g	3384009	g	3456916	a	3371708	s	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
t	3385293	c	3458200	t	3372992	ns	t	APEC	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t									
g	3390054	g	3462961	a	3377753	s	g	S88	++	g	g				a																	
g	3390974	a	3463881	g	3378673	nc	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
a	3393399	c	3466306	a	3381098	s	a	APEC	++	g	a	g	g	g							g	g	g									
a	3407635	a	3480542	g	3395334	nc	a	S88	+++	a	a	a	a	a		a																
a	3412782	g	3485689	g	3400481	nc	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g		g	g	g	g	g	g	g	g	g	g	g	
1	3413113	-	3486019	-	3400811	ins	-	UTI89	++	-	-																					

ExPEC Cluster										Outgroup Strains[g]																						
UTI89[a]	UTI89 site[b]	APEC 01[a]	APEC 01 site[b]	S88[a]	S88 site[b]	type[c]	Inferred ancestral base[d]	Lineage inferred to mutate[e]	Support level[f]	CFT073	ED1a	536	E2348/69	SMS 3-5	IAI39	UMN026	K-12	ATCC 8739	HS	D1 Sd197	CB9615	Sakai	EDL933	IAI1	E24377A	SE11	SS Ss046	F2a 301	F2a 2457T	F5 8401	B4 Sb227	B18 BS512
a	3420332	g	3493238	a	3408030	nc	a	APEC	++	a	a	a	a	a	a	a	a	a	a		a	a	a	a	a	a	a	g		g		
c	3427774	t	3500680	t	3415472	ns	t	UTI89	++	t	t	t	t	t	c	t	c	c	c	c	c	c	c	t	c	c	c	c	c	c	t	t
c	3444531	t	3517437	t	3432229	nc	t	UTI89	++	t	t	t	t	t	t	t	t	t	t	t	c	t	t	c	c	t	t	c	c	c	t	t
g	3446218	c	3519124	c	3433916	ns	g	AS	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	3446506	c	3519412	t	3434204	ns	c	S88	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	3450975	a	3523881	g	3438673	ns	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	
a	3450997	t	3523903	a	3438695	ns	a	APEC	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	
t	3455665	g	3528571	g	3443363	s	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	3471014	a	3543920	g	3458712	s	g	APEC	++++	g	g	g	g	g	g	g	g	g	g		g	g	g	g	g	g	g	g	g	g	g	g
g	3481970	g	3554876	a	3469668	s	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	3484595	c	3557501	t	3472293	ns	c	S88	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
a	3489993	a	3562899	g	3477691	ns	a	S88	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
6	3491975	-	3564880	-	3479672	del	6	AS	++++	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
g	3499438	a	3572338	a	3487130	s	g	AS	++++	g	g	g	g	g	g	g	g	g	g		g	g	g	g	g	g	g	g		g		
g	3507025	g	3579925	t	3494717	nc	g	S88	++	g	a	a	g	g	g	g	a	g	g		a	a	a	g	g	g						
g	3508405	g	3581305	a	3496097	s	g	S88	++++	g	g	g	g	g	g	g	g	g	g		g	g	g	g	g	g						
t	3513206	c	3586106	t	3500898	nc	t	APEC	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
g	3517552	a	3590452	a	3505244	ns	a	UTI89	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
c	3525829	g	3598729	g	3513521	ns	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	3533540	g	3606440	a	3521232	s	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
a	3550309	g	3623209	g	3538001	s	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	3550318	g	3623218	g	3538010	ns	g	UTI89	++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	a	a	a	g	g	g	g	a	a
-	3550306	12	3623224	12	3538016	del	12	UTI89	++++	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
t	3552525	c	3625437	c	3540229	nc	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	3556685	a	3629597	a	3544389	s	g	AS	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
a	3567486	g	3640398	a	3555190	ns	a	APEC	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
c	3569723	c	3642635	t	3557427	ns	c	S88	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	3580723	a	3653635	g	3568427	ns	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	3583074	g	3655986	a	3570778	s	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	3590721	g	3663633	a	3578425	s	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	3598897	a	3671809	c	3586601	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	3600484	t	3673396	g	3588188	ns	t	S88	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
c	3615102	c	3688014	t	3602806	s	c	S88	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	3624876	t	3697788	t	3612580	ns	g	AS	+++	g	g	g			g																g	g
-	3631731	-	3704652	1	3619445	ins	-	S88	++++	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-				-	-
t	3633752	c	3706664	c	3621457	s	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	3639450	c	3712362	c	3627155	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
a	3642556	g	3715468	g	3630261	ns	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	3643031	t	3715943	c	3630736	nc	c	APEC	++	t	c	c	c	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
g	3643073	a	3715985	g	3630778	nc	g	APEC	++	a	g	g	g	a	a	a	a	a	g	a	a	a	a	a	a	a	a	a	a	a	g	g
g	3644261	g	3717176	a	3631966	nc	g	S88	++	a	g	g	g	g	a	g	g	g	g	g	g	g	g	g	g	a	g	a	a	a	a	a
g	3668419	a	3741334	g	3656124	ns	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
-	3672118	1	3745034	-	3659823	ins	-	APEC	+++	-	-	-					-	-	-								-					
g	3672132	t	3745048	g	3659837	s	g	APEC	+++	g	g	g					g	g	g								g					
-	3672132	2	3745049	-	3659837	ins	-	APEC	+++	-	-	-					-	-	-								-					
-	3672136	1	3745055	-	3659841	ins	-	APEC	+++	-	-	-					-	-	-								-					
-	3672148	1	3745068	-	3659853	ins	-	APEC	+++	-	-	-					-	-	-								-					
-	3672161	1	3745082	-	3659866	ins	-	APEC	+++	-	-	-					-	-	-								-					
-	3672164	1	3745086	-	3659869	ins	-	APEC	+++	-	-	-					-	-	-								-					
-	3672202	1	3745125	-	3659907	ins	-	APEC	+++	-	-	-					-	-	-								-					
-	3672219	1	3745143	-	3659924	ins	-	APEC	+++	-	-	-					-	-	-								-					
-	3672236	1	3745161	-	3659941	ins	-	APEC	+++	-	-	-					-	-	-								-					
-	3672241	1	3745167	-	3659946	ins	-	APEC	+++	-	-	-					-	-	-								-					
13	3672855	-	3745780	-	3660559	del	13	AS	+++	13	13	13					13	13	13								13					
-	3672855	-	3745799	13	3660560	ins	13	S88	-	13	13	13					13	13	13								13					
-	3672867	19	3745781	-	3660559	ins	-	APEC	+++	-	-	-					-	-	-								-					
-	3672889	1	3745822	-	3660594	ins	-	APEC	+++	-	-	-					-	-	-								-					
c	3676558	a	3749491	c	3664263	ns	c	APEC	+++	c	c	c					c	c	c													
g	3681099	-	3753951	a	3668804	s	g	S88	+++	g	g	g					g	g	g													
-	3687648	10	3760585	-	3675353	ins	-	APEC	+++	-	-	-					-	-	-								-					
a	3689472	a	4497219	g	4411761	nc	t	S88	+/-	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
4	3694355	4	4532506	-	4447035	del	4	S88	++++	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
g	3698065	a	4528802	a	4443338	nc	t	UTI89/AS	+/-	t	c	c	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
g	3698112	g	4528755	a	4443291	nc	t	S88	+/-	c	c	c	t	c	t	c	c	c	c	c	c	c	c	c	t	c	t	t	t	t	a	t
t	3706383	c	4520477	c	4435019	ns	g	UTI89/AS	+/-	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
t	3722302	c	4504558	c	4419100	s	g	UTI89/AS	+/-	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
t	3728156	c	3760933	c	3675692	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	3728166	a	3760943	a	3675702	s	a	UTI89	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
t	3728169	a	3760946	a	3675705	s	a	UTI89	++	a	a	a	a	a	a	a	a	a	a	t	t	t	t	a	a	a	a	a	a	a	a	a
g	3728223	a	3761000	a	3675759	s	g	AS	++	g	a	g	a	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
a	3728295	g	3761072	g	3675831	s	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
a	3728496	g	3761273	g	3676032	s	a	AS	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
c	3728967	a	3761744	a	3676503	s	a	UTI89	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
g	3753314	g	3786091	a	3700850	ns	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	3766749	g	3799526	a	3714285	s	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	3780894	a	3813671	a	3728430	ns	c	AS	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	3783011	a	3815788	g	3730547	s	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	3783110	g	3815887	a	3730646	s	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	3807698	g	3840475	a	3755234	s	g	S88	++	g	g	g	g	g	g	g	g	g	g	g	a	a	a	g	g	g	g	g	g	g	g	g
g	3812028	a	3844805	g	3759564	ns	g	APEC	++++	g	g	g	g	g	g	g	g	g	g		g	g	g	g	g	g	g	g	g	g	g	g
1	3812437	-	3845213	-	3759972	del	1	AS	++++	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
t	3814527	c	3847303	t	3762062	ns	c	APEC	-	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c

ExPEC Cluster										Outgroup Strains[g]																						
UTI89[a]	UTI89 site[b]	APEC 01[a]	APEC 01 site[b]	S88[a]	S88 site[b]	type[c]	Inferred ancestral base[d]	Lineage inferred to mutate[e]	Support level[f]	CFT073	ED1a	536	E2348/69	SMS 3-5	IAI39	UMN026	K-12	ATCC 8739	HS	D1 Sd197	CB9615	Sakai	EDL933	IAI1	E24377A	SE11	SS Ss046	F2a 301	F2a 2457T	F5 8401	B4 Sb227	B18 BS512
g	3816742	g	3849518	a	3764277	ns	g	S88	++++	g	g	g	g	g	g			g	g	g		g	g	g	g	g	g				g	g
-	3819082	1	3851868	1	3766627	del	1	UTI89	+++	1	1	1				1																
-	3820270	8	3853048	-	3767806	ins	-	APEC	+++	-	-	-				-																
1	3820615	-	3853399	-	3768150	del	1	AS	+++	1	1	1				1																
g	3824281	a	3857065	a	3771816	s	g	AS	+++	g	g	g				a																
a	3825492	g	3858276	g	3773027	ns	g	UTI89	+++	g	g	g				g																
t	3829512	c	3862296	c	3777047	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
a	3831347	g	3864131	g	3778882	s	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
a	3832427	g	3865211	g	3779962	ns	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
t	3835020	t	3867804	c	3782555	s	t	S88	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
g	3843994	t	3876781	t	3791529	nc	g	AS	++++	g	g	g			g	g	g	g	g					g	g	g					g	g
g	3845773	g	3878560	t	3793308	nc	g	S88	++	g	g	g			g	g	t	t	t					t	t	t					t	t
c	3853083	t	3885870	c	3800618	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
a	3859041	g	3891828	a	3806576	s	a	APEC	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
g	3864493	a	3897280	g	3812028	ns	?	APEC	+/-																							
c	3870043	a	3902838	c	3817578	ns	c	APEC	++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	-	-	c	c	c	c	c	-	-
a	3873522	g	3906317	g	3821057	s	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	a	g	g	g	g	g	g	g	g
t	3876221	g	3909016	t	3823756	s	t	APEC	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
a	3877813	a	3910608	t	3825348	ns	a	S88	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
g	3880172	g	3912967	a	3827707	ns	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	a
g	3880907	t	3913702	t	3828442	ns	t	UTI89	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
a	3881372	g	3914167	g	3828907	ns	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	3884077	c	3916872	t	3831612	ns	c	S88	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	3891483	g	3924278	a	3839018	s	g	S88	++++	g	g	g	g	g	g	g	g	g	g		g	g	g	g	g	g	g	g	g	g	g	g
g	3892367	a	3925162	g	3839902	ns	g	APEC	++++	g	g	g	g	g	g	g	g	g	g		g	g	g	g	g	g	g	g	g	g	g	g
c	3904420	t	3937215	t	3851955	ns	t	UTI89	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
a	3908902	g	3941697	a	3856437	ns	a	APEC	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
g	3910609	a	3943404	a	3858144	ns	g	AS	++++	g	g	g	g			g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
t	3911193	t	3943988	c	3858728	ns	t	S88	++++	t	t	t	t	t	t	t	t	t	t		t	t	t	t	t	t	t	t	t	t	t	t
a	3915496	g	3948291	g	3863031	s	g	UTI89	++++	g	g	g	g	g	g	g				g	g	g	g									
c	3918150	c	3950945	a	3865685	s	c	S88	++++	c	c	c	c	c	c	c				c	c	c	c									
g	3923587	a	3956382	g	3871122	nc	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
a	3928162	g	3960957	g	3875697	ns	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	3931406	t	3964201	t	3878941	nc	c	AS	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
1	3931749	-	3964543	1	3879284	del	1	APEC	++++	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
a	3932330	a	3965124	c	3879865	ns	a	S88	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
g	3942924	g	3975718	a	3890459	ns	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
t	3947345	g	3980139	g	3894880	ns	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
a	3950138	a	3982932	g	3897673	nc	a	S88	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
a	3950965	g	3983759	a	3898500	ns	a	APEC	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
a	3952712	c	3985506	c	3900247	s	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
1	3961295	1	3994099	-	3908839	del	1	S88	++++	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1
t	3964225	t	3997019	a	3911759	s	t	S88	++++	t	t	t	t	t	t	t	t	t		t	t	t	t	t	t	t	t	t	t	t	t	t
g	3965091	g	3997885	a	3912625	ns	g	S88	++++	g	g	g	g	g	g	g	g	g		g	g	g	g	g	g	g	g	g	g	g	g	g
a	3967376	a	4000170	c	3914910	s	c	S88	-	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	3969624	a	4002418	a	3917158	s	g	AS	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	3994180	a	4026974	a	3941714	s	a	UTI89	++++	a	a	a	a	a	a	a	a	a	a		a	a	a	a	a	a	a	a	a	a	a	a
g	3995800	a	4028594	g	3943334	ns	g	APEC	++++	g	g	g	g	g	g	g	g	g	g		g	g	g	g	g	g	g	g	g	g	g	g
10	4001950	-	4034743	-	3949483	del	10	AS	++++	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10		10	10	10	10	10
-	4001959	10	4034744	-	3949483	ins	10	APEC	-	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10		10	10	10	10	10
1	4001960	1	4034754	-	3949483	del	1	S88	++++	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1
g	4003221	g	4036015	a	3950744	ns	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g		g	g	g	g	g
c	4006008	a	4038802	a	3953531	s	c	AS	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c		c	c	c	c	c
a	4009250	g	4042044	g	3956773	s	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g					g	g	g		g	g	g	g	g
g	4009832	a	4042626	a	3957355	ns	g	AS	++++	g	g	g	g	g	g	g	g	g	g					g	g	g					g	g
a	4011887	a	4044681	g	3959410	ns	a	S88	++++	a	a	a	a	a	a	a	a	a	a					a	a	a		a	a	a	a	a
a	4015231	g	4048027	g	3962754	ns	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g					g	g	g			g			
g	4016358	g	4049154	a	3963881	s	g	S88	++++	g	g	g	g	g	g	g	g	g	g					g	g	g			a			
t	4017100	c	4049896	c	3964623	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c					c	c	c			c			
t	4019128	a	4051924	t	3966651	ns	t	APEC	++++	t	t	t	t	t	t	t	t	t	t		t	t	t	t	t	t		t	t	t	t	t
g	4024139	g	4056935	a	3971662	ns	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	4026879	a	4059675	g	3974402	ns	g	APEC	++++	g	g	g	g	g	g	g	g	g	g		g	g	g	g	g	g	g	g	g	g	g	g
c	4038610	a	4071406	a	3986133	ns	a	UTI89	++++	a	a	a	a	a	a	a		a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
c	4042551	t	4075347	c	3990074	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	4053654	a	4086450	c	4001177	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	4057240	a	4090036	a	4004763	ns	g	AS	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	4070308	t	4103104	c	4017831	nc	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	4072891	c	4105687	c	4020414	s	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	4075283	g	4108079	a	4022806	ns	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
t	4081357	c	4114153	c	4028880	s	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
a	4089040	g	4121836	g	4036563	ns	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	4094343	g	4127139	t	4041866	s	g	S88	+++	g	g	g	g	g	g																	
c	4101317	t	4134113	c	4048840	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	4105097	g	4137893	c	4052620	s	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g					g	g
t	4109445	c	4142241	c	4056968	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	4113443	g	4146239	a	4060966	ns	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
a	4118145	a	4150941	c	4065668	s	a	S88	++	a	a	a	a	g	g	g	g	a	a	g	g	g	g	g	g	g	a	a	a	a	g	g
-	4122295	1	4155092	-	4069818	ins	1	APEC	-	1	1	1	1	1	1	1	1			1	1	1	1	1	1	1		1	1	1		
c	4123464	t	4156261	t	4070987	ns	c	AS	++++	c	c	c	c	c	c	c	c			c	c	c	c	c	c	c		c	c	c		
11	4123492	-	4156288	-	4071014	del	11	AS	++++	11	11	11	11	11	11	11	11			11	11	11	11	11	11	11		11	11	11		
-	4123502	11	4156289	-	4071014	ins	11	APEC	-	11	11	11	11	11	11	11	11			11	11	11	11	11	11	11		11	11	11		
1	4123503	1	4156300	-	4071014	del	1	S88	++++	1	1	1	1	1	1	1	1			1	1	1	1	1	1	1		1	1	1		

ExPEC Cluster										Outgroup Strains[g]																						
UTI89[a]	UTI89 site[b]	APEC 01[a]	APEC 01 site[b]	S88[a]	S88 site[b]	type[c]	Inferred ancestral base[d]	Lineage inferred to mutate[e]	Support level[f]	CFT073	ED1a	536	E2348/69	SMS 3-5	IAI39	UMN026	K-12	ATCC 8739	HS	D1 Sd197	CB9615	Sakai	EDL933	IAI1	E24377A	SE11	SS Ss046	F2a 301	F2a 2457T	F5 8401	B4 Sb227	B18 BS512
1	4124218	1	4157025	-	4071738	del	1	S88	++++	1	1	1	1	1	1	1	1			1	1	1	1	1	1	1		1	1	1		
g	4133561	a	4166358	a	4081071	ns	a	UTI89	++++	a	a	a	a	a	a	a	a	a	a					a	a	a	a	a	a	a		
a	4138967	a	4171764	g	4086477	s	a	S88	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
g	4157079	t	4189876	t	4104589	s	g	AS	++	g	g	g	g	g	a	g	g	g	g	a	g	g	g	g	g	g	g	g	g	g	g	g
c	4158139	t	4190936	c	4105649	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	4158435	g	4191232	a	4105945	nc	g	S88	++	g	g	g	g	g	g	g	-	-	-	g	g	g	g	-	-	-	-	-	-	-		
5	4158742	-	4191538	-	4106251	ins	-	UTI89	++++	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
c	4160304	g	4193096	g	4107809	ns	g	UTI89	++++	a	g	g	g				g	g	g					g	g	g	g	g	g	g		
g	4168607	g	4201399	a	4116112	s	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
a	4172397	g	4205189	g	4119902	nc	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
-	4172678	5	4205471	-	4120183	ins	-	APEC	+++	-	-	-	-				-	-	-													
c	4173610	t	4206407	t	4121115	ns	c	AS	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	4173711	t	4206508	g	4121216	ns	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
t	4174585	a	4207382	a	4122090	nc	t	AS	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
g	4176975	a	4209772	g	4124480	s	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	4179841	a	4212638	a	4127346	s	a	UTI89	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
g	4183713	g	4216510	t	4131218	nc	g	S88	++	a	g	g	g	g	g	g	g	g	g	t	g	g	g	g	g	g	g	g	g	g	g	g
a	4187124	g	4219921	g	4134629	ns	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	4202885	a	4235682	a	4150390	nc	c	AS	++++	c	c	c	a	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	4204502	a	4237299	a	4152007	nc	a	UTI89	++	a	g	a	g	a	a	a	a	a	g	a	g	a	r	a	a	g	a	a	a	a	a	a
a	4204544	g	4237341	g	4152049	nc	a	AS	++	a	a	a	a	-	a	a	a	a	a	-	a	a	a	a	a	a	a	a	a	a	a	a
c	4204887	c	4237684	t	4152392	ns	c	S88	++	c	c	c	c	c	t	c	c	c	c	c	c	c	c	t	t	t	c	t	t	t	t	t
a	4207259	g	4240056	g	4154764	nc	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	4208037	t	4240834	g	4155542	ns	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	4214370	c	4247167	t	4161875	ns	c	S88	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	4216893	g	4249690	t	4164398	ns	t	APEC	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
t	4218285	c	4251082	t	4165790	s	t	APEC	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
t	4239927	c	4272724	c	4187432	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	4242503	c	4275300	g	4190008	nc	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
6	4247939	-	4280735	-	4195443	del	6	AS	++	6	6	6	6	6	-	6	-	-	-	-	-	6	6	6	6	6	6	6	6	6	6	6
6	4247935	6	4280736	-	4195443	del	6	S88	++	6	6	6	6	6	-	6	-	-	-	-	-	6	6	6	6	6	6	6	6	6	6	6
g	4247989	g	4280780	a	4195482	s	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
t	4250508	c	4283299	c	4198001	s	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	4256863	a	4288878	a	4203580	ns	g	AS	++++	g			g		g				g					g	g	g		g	g	g		
a	4260364	g	4292379	g	4207081	s	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	4261500	g	4293515	a	4208217	ns	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
t	4264120	t	4296135	g	4210837	ns	t	S88	++++	t	t	t	t	t	t	t				t	t	t	t				t				t	t
g	4267068	a	4299083	a	4213785	ns	g	AS	++++	g	g	g	g	g	g						g	g	g	g	g	g	g					
t	4267978	c	4299993	c	4214695	ns	c	UTI89	++++	c	c	c	c	c	c						c	c	c	c	c	c						
c	4277937	a	4309952	c	4224505	ns	c	APEC	++	c	c	c	c	c	c	t	t	c	c	t	t	t	t	c	c	c	t	t	t	t	t	t
g	4282540	t	4314555	t	4229108	ns	g	AS	+++	g	g	g	g																			
a	4287127	a	4319142	g	4233695	ns	a	S88	+++	a	a	a	a																			
c	4288098	t	4320113	t	4234666	ns	c	AS	+++	c	c	c	c	c																		
a	4303644	a	4335659	g	4250212	nc	a	S88	+++	a	a	a		a	a																	
t	4308604	c	4340619	c	4255172	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
a	4308862	g	4340877	a	4255430	ns	a	APEC	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
a	4308923	g	4340938	g	4255491	s	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
t	4314651	c	4346666	c	4261219	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	4319323	a	4351338	a	4265891	ns	a	UTI89	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
1	4321682	1	4353707	-	4268259	del	1	S88	++++	1	1	1	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
-	4323809	-	4355834	17	4270376	ins	17	S88	++	-	17	17	17	17	-	17	17	17	17	-	17	17	17	17	17	17	17	17	17	17	17	17
t	4326969	a	4358981	a	4273536	nc	a	UTI89	++	a	a	t	t	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	t
-	4326980	1	4358993	-	4273547	ins	1	APEC	-	1	-	1	1	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	1	1
c	4327063	t	4359077	c	4273630	s	t	APEC	-	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
g	4327420	a	4359434	g	4273987	s	g	APEC	++++	a	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	4327628	c	4359642	t	4274195	ns	c	S88	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	4328003	c	4360017	t	4274570	ns	c	APEC	-	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	4329494	c	4361508	t	4276061	ns	c	APEC	-	c	c	t	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	4330908	t	4362922	c	4277475	s	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c		c	c	c	c	c
g	4331841	g	4363855	a	4278408	ns	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	4337788	t	4369802	c	4284355	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	4337870	c	4369884	a	4284437	ns	c	S88	++	c	c	c	c	c	c	t	t	t	t	c	t	t	t	t	t	t	c	c	c	c	t	t
t	4346216	g	4378230	t	4292783	nc	g	APEC	-	g	g	g	g	t	t	t	g	g	g	t	g	g	g	t	t	t	t	g	g	g	t	t
c	4346219	a	4378233	c	4292786	nc	a	APEC	-	a	a	a	a	c	c	c	a	a	a	c	a	a	a	c	c	c	c	a	a	a	c	c
c	4350660	t	4382674	c	4297227	ns	c	APEC	++++	c		c	c					c	c								c				c	t
g	4355289	a	4387303	g	4301856	s	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
t	4356066	g	4388080	g	4302633	ns	t	AS	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
g	4356253	g	4388267	a	4302820	ns	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	4358731	a	4390745	a	4305298	s	g	AS	+++	g	g	g	g											g	g	g						
g	4376700	a	4408714	g	4323364	ns	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	4378502	t	4410516	g	4325166	s	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	t
c	4381800	a	4413814	a	4328464	s	a	UTI89	++	a	a	a	a	a	a	a	c	c	c	c	a	a	a	c	c	c	c	c	c	c	c	c
c	4386168	c	4418182	t	4332832	ns	c	S88	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	4392465	t	4424479	c	4339129	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	4396844	t	4428858	c	4343508	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	4398086	g	4430100	a	4344750	s	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	a
c	4399624	t	4431638	t	4346288	s	c	AS	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	4415530	c	4447544	t	4362194	ns	c	S88	+++	c	c	c	c	c	c	c																
c	4416029	a	4448043	a	4362693	ns	c	AS	+++	c	c	c	c	c	c	c																
g	4418667	a	4450681	a	4365331	ns	a	UTI89	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
g	4425710	g	4457724	a	4372374	ns	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
a	4432590	g	4464604	g	4379254	s	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g

ExPEC Cluster										Outgroup Strains[g]																						
UTI89[a]	UTI89 site[b]	APEC 01[a]	APEC 01 site[b]	S88[a]	S88 site[b]	type[c]	Inferred ancestral base[d]	Lineage inferred to mutate[e]	Support level[f]	CFT073	ED1a	536	E2348/69	SMS 3-5	IAI39	UMN026	K-12	ATCC 8739	HS	D1 Sd197	CB9615	Sakai	EDL933	IAI1	E24377A	SE11	SS Ss046	F2a 301	F2a 2457T	F5 8401	B4 Sb227	B18 BS512
t	4439821	c	4471835	c	4386485	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	4451182	c	4483196	c	4397846	s	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	4456503	c	4488517	c	4403167	nc	t	AS	++++	t	c	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
c	4456576	a	4488591	a	4403241	nc	c	AS	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
a	4470134	t	4542436	t	4456964	ns	a	AS	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	
a	4478703	g	4551005	g	4465533	ns	g	UTI89	++++	g	g	g	g	g	g	g				g	g	g	g				g	g	g	g	g	g
g	4478744	t	4551046	t	4465574	s	g	AS	++++	g	g	g	g	g	g	g				g	g	g	g				g	g	g	g	g	g
t	4481797	a	4554099	a	4468627	s	a	UTI89	++++	a	a	a	a	a	a	a				a	a	a	a				a	a	a	a	a	a
c	4492351	t	4564653	t	4479181	ns	c	AS	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
a	4500681	g	4572983	g	4487511	ns	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g		g	g	g	g	g	g	g	g	g	g		
g	4501489	a	4573791	a	4488319	s	g	AS	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
t	4505609	c	4577911	c	4492439	s	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	4517245	a	4589547	a	4504075	ns	a	UTI89	++	a																						
a	4517608	t	4589910	a	4504438	nc	a	APEC	++	a																						
c	4527611	t	4599913	t	4514441	s	c	AS	+++	c	c	c	c																			
c	4532922	a	4605224	a	4519752	ns	a	UTI89	+++	a	a	a	a																			
g	4535506	g	4607808	a	4522336	ns	g	S88	+++	g	g	g	g																			
c	4539161	a	4611463	c	4525991	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
t	4547605	t	4619907	g	4534435	s	t	S88	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t		t
t	4548569	g	4620871	g	4535399	ns	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g		g
t	4563564	c	4635866	c	4550394	nc	c	UTI89	++	c	c	c	c	c	c	c	c	t	t		c	c	c	t	t	t	c	c	c	c	c	c
t	4575924	c	4648226	c	4562754	s	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c		c	c	c	c	c	c	c	c	c	c	c	
1	4587439	-	4659740	-	4574268	ins	-	UTI89	++++	-	-	-	-	-	-		-	-								-						
g	4589577	a	4661878	a	4576406	s	g	AS	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g				g	
g	4592588	g	4664889	a	4579417	s	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g				g	
c	4594196	c	4666497	t	4581025	s	c	S88	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c				c	
c	4595967	t	4668268	c	4582796	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c				c	c
c	4597175	t	4669476	c	4584004	s	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c				c	c
c	4606547	t	4678848	t	4593376	s	c	AS	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	
a	4609416	g	4681717	g	4596245	nc	g	UTI89	++	g	g	g	g	g	g	g	g	g	g	c	c	c	c	g	g	g	g	g	g	g	g	g
c	4611716	t	4684017	c	4598545	nc	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
a	4619731	c	4692032	c	4606560	ns	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	
t	4624459	g	4696760	g	4611288	ns	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g				g	
1	4624611	-	4696911	-	4611439	del	1	AS	++	1	-	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-				-	
a	4632392	a	4704692	g	4619220	nc	a	S88	++++	a	a	a	a	a	a	a	a	a	a		a	a	a	a	a	a	a					
t	4632763	c	4705063	c	4619591	s	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c		c	c	c	c	c	c	c					
g	4633784	a	4706084	a	4620612	ns	a	UTI89	++++	a	a	a	a	a	a	a	a	a	a		a	a	a	a	a	a	a					
t	4634424	c	4706724	t	4621252	nc	t	APEC	++++	t	t	t	t	t	t	t	t		t	t	t	t	t	t	t	t	t	t	t	t		
1	4634670	-	4706969	-	4621497	ins	-	UTI89	++	-	-	1	1	1	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
-	4634685	t	4707039	c	4621567	nc	t	S88	++	t	t				t																	
-	4634685	g	4718986	a	4633514	nc	g	S88	++++	g	g	g		g	g							g	g		g							
-	4634685	1	4721636	-	4636163	indel	?	APEC/S88	+/-	1	-																					
-	4634685	c	4727253	t	4641780	nc	t	APEC	++	t	t																					
-	4634685	a	4728234	g	4642761	nc	g	APEC	++	g	g			g																		
-	4634685	t	4730261	a	4644788	nc	a	APEC	++	a	a																					
-	4634685	9	4735685	-	4650211	indel	?	APEC/S88	+/-	-	9																					
-	4634685	c	4742689	a	4657207	nc	c	S88	++	c	c																					
-	4634685	t	4752085	c	4666747	nc	t	S88	++	t																						
-	4634685	c	4756391	t	4671053	nc	c	S88	++	c	c																					
c	4659911	t	4795635	t	4710297	s	c	AS	++	c	c	c	c	c	t	c	t	t	c	c	c	c	c	t	t	c	t	t	t	t	t	t
a	4668288	g	4804012	g	4718674	ns	a	AS	++	a	a	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	4685229	t	4820953	t	4735615	ns	t	UTI89	++++	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t
c	4685567	c	4821291	t	4735953	ns	c	S88	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	4688115	c	4823839	t	4738501	nc	c	S88	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	4693391	a	4829115	c	4743777	s	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	4695091	t	4830815	t	4745477	ns	c	AS	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	4712240	t	4847187	-	4752209	s	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
c	4724285	a	4859232	-	4752209	ns	a	UTI89	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
a	4731087	t	4866034	-	4752209	ns	a	APEC	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
a	4740160	g	4875107	-	4752209	s	a	APEC	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
t	4748256	c	4883203	-	4752209	s	c	UTI89	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
a	4754031	t	4888978	-	4752209	ns	a	APEC	+++	a	a	a			a																	
g	4754373	a	4889320	-	4752209	ns	a	UTI89	+++	a	a	a			a																	
c	4755780	t	4890727	-	4752209	ns	c	APEC	+++	c	c	c			c																	
g	4755827	c	4890774	-	4752209	ns	g	APEC	+++	g	g	g			g																	
c	4758564	t	4893511	-	4752209	ns	c	APEC	+++	c	c	c			c																	
t	4759928	c	4894875	-	4752209	nc	t	APEC	++	t	c	t	t	t	t	t	c	c	t	c	c	c	c	t	c	t	t	c	c	c	c	c
a	4759932	g	4894879	-	4752209	nc	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
-	4770283	1	4905231	-	4752209	ins	-	APEC	++++	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
c	4771664	t	4906612	-	4752209	ns	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	4774899	t	4909847	-	4752209	ns	g	APEC	++++	g	g	g		g	g	g	g		g								g					
a	4775219	c	4910167	-	4752209	ns	c	UTI89	++++	c	c	c		c	c	c	c		c								c					
g	4791714	g	3318606	a	3233390	s	g	S88	+++	g		g			g	g																
t	4792233	g	3319125	g	3233909	s	t	AS	+	t		g			t	t																
a	4793296	t	3320188	t	3234972	s	t	UTI89	+++	t		t			t	t																
a	4794105	c	3320997	c	3235781	ns	a	AS	+++	a		a			a	a																
a	4794478	g	3321370	g	3236154	s	g	UTI89	+++	g		g			g	g																
t	4794495	c	3321387	c	3236171	ns	c	UTI89	+++	c		c			c	c																
g	4794803	a	3321695	g	3236479	ns	g	APEC	+++	g		g			g	g																
g	4796431	g	3323323	a	3238107	nc	?	S88	+/-																							
g	4907674	t	4923903	g	4885749	nc	g	APEC	++	g	g	g	g	g	t	g	g		g		t	t	t	g		g	g	g	g		g	
g	4912752	a	4928981	g	4890828	s	g	APEC	++++	g		g	g	g	g	g	g		g		g	g	g	g	g	g	g	g	g		g	g

ExPEC Cluster										Outgroup Strains[g]																						
UTI89[a]	UTI89 site[b]	APEC 01[a]	APEC 01 site[b]	S88[a]	S88 site[b]	type[c]	Inferred ancestral base[d]	Lineage inferred to mutate[e]	Support level[f]	CFT073	ED1a	536	E2348/69	SMS 3-5	IAI39	UMN026	K-12	ATCC 8739	HS	D1 Sd197	CB9615	Sakai	EDL933	IAI1	E24377A	SE11	SS Ss046	F2a 301	F2a 2457T	F5 8401	B4 Sb227	B18 BS512
g	4913801	t	4930030	t	4891877	ns	t	UTI89	++++	t	t	t	t	t	t	t	t	t	t		t	t	t	t	t	t	t	t	t		t	t
c	4919522	t	4935751	t	4899954	s	t	UTI89	++++	t		t	t	t			t	t									t	t	t		t	t
c	4945745	t	4961974	c	4911459	s	c	APEC	++++	c		c	c	c	c	c	c	c	c		c	c	c	c	c	c					c	c
c	4949832	a	4966061	c	4918134	s	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c					c	c
t	4974091	g	4990320	t	4940268	ns	t	APEC	++++	t	t	t	t	t	t	t	t	t	t		t	t	t	t	t	t	t	t	t	t	t	t
c	4974109	t	4990338	c	4940286	s	c	APEC	++++	c	c	c	c	t	c	c	c	c	c		c	c	c	c	c	c	c	c	c	c	c	c
a	4976994	g	4993223	g	4943169	s	a	AS	++	a	a	a	a	g	a	a	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
a	4983543	g	4999772	g	4949716	s	a	AS	++	a	a	a	a	a	a	a	g	g	g	g	g	g	g	g	g	g	g	g	g	g	a	a
a	4983865	g	5000094	a	4950038	nc	a	APEC	++++	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
t	4986069	g	5002299	g	4952310	s	g	UTI89	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
g	4988688	a	5004918	a	4954929	nc	?	UTI89/AS	+/-																							
a	4988713	g	5004943	g	4954954	nc	?	UTI89/AS	+/-																							
c	4989741	t	5005971	c	4955982	ns	?	APEC	+/-																							
g	4989979	a	5006209	a	4956220	s	?	UTI89/AS	+/-																							
c	4990632	t	5006862	t	4956873	ns	c	AS	++												c											
a	4992238	g	5007574	g	4957585	ns	g	UTI89	++++								g				g						g					
g	4996702	a	5012038	a	4962049	s	g	AS	++		g				g																t	
g	5001290	g	5015977	t	4965987	s	g	S88	++	g	g				t	g					g											t
a	5009646	g	5026944	a	4976954	ns	a	APEC	+				a		a	a					a	a	a									
g	5024687	g	5041982	a	4991992	s	g	S88	++	g	g		g	g	g	g		g	g		g	g	g	g		g	a	a	a	a	a	g
g	5037621	a	5053886	g	5003896	s	g	APEC	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g
c	5040452	t	5056717	c	5006930	s	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	t	c
c	5051251	t	5067516	c	5017778	s	c	APEC	++++	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
g	5051312	g	5067577	t	5017839	ns	g	S88	++++	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g	g

[a] Numbers in place of bases indicates number of bases where >2 bases inserted or deleted. In these cases "-" indicates absence of these bases.

[b] For indels the base indicated is the base before the insertion or deletion in the strain.

[c] s: synonymous; ns: non-synonymous; nc: in non-coding gene; i: intergenic; ins: small insert; del: small deletion; indel: the small indels that can't be allocated

[d] The base in the common ancestor of the 3 ExPEC strains as inferred from outgroup analysis.

[e] AS: allocated to the lineage to the common ancestor of APEC 01 and S88; UTI89/AS: allocated to the divergence between UTI89 and the common ancestor of APEC 01 and S88 (strain not specified); APEC/S88: allocated to the divergence between APEC 01 and S88 lineages (lineage not specified)..

[f] Level of support for allocation of mutation as given in previous column

++++ agreement is high - 8 or more outgroup strains with expected base and at most 1 with an alternative base, and at least 2 of the CFT073, ED1a and 536 support the expected base)

+++ agreement good - 4 or more outgroup strains with expected base and at most 1 with an alternative base, and at least 2 of the CFT073, ED1a and 536 support the expected base)

++ supported by at least 2 of the CFT073, ED1a and 536 regardless of situation with other outgroup strains

+ no conflict but very limited support as either site absent or conflict in all of CFT073, ED1a and 536, or conflict among them, and/or support is less than required for any of the higher levels of support.

+/- no conflict but no support (base not present in any outgroup OR base when present is not that in any of the ExEPEC strains OR both alternative lineages supported equallly.

- conflict data implies 2 mutations at that site - eg in the ancestor of 3 ExEPEC strains before isolation and again in one of the lineages.

[g] Base, number or "-" indicates the base type or absence of the base. Blank means the site not present.