

Supplementary Table S1. The accession numbers for CPS gene clusters of *C. jejuni*

CPS types	Accession number
HS1	BX545859
HS2	AL111168.1
HS3	HQ343268
HS4c	HQ343269
HS5/31	KT868847
HS6/S7	NC_009839
HS8/17	HQ343270
HS9	KT868844
HS10	HQ343271
HS11	KT868845
HS12	KT868848
HS15/31/58	HQ343272
HS18	KT932997
HS19	BX545860
HS21	KT868849
HS22	KT893439
HS23/36	BX545858
HS27	KT893437
HS29	KT868846
HS32	KT893435
HS33/35	KT893436
HS37	KT893431
HS38	KT893430
HS40	KT893434
HS41	BX545857
HS42	HQ343274
HS44	JF496678
HS45/5/32/60	KT893432
HS52	KT893429
HS53	CP000025.1
HS55	KT893433
HS57	KT893428
HS58/32	KT893427
HS60	KT893426
HS63	KT893438

Supplementary Table S2. The accession numbers for LOS gene clusters of *C. jejuni*

LOS class	Accession number
A	AF215659
B	AF401528
C	AF400047
D	AF400669
E	AJ131360
F	AY423554
G	AY436358
H	AY800272
I	EU404107
J	EU404104
K	AY573819
L	EU404111
M	EF140720
N	AY816330
O	EF143352
P	AY943308
Q	EU404112
R	AY962325
S	EU404110
T	AIOC00000000
U	AIOU00000000
V	AIOP00000000
W	CP001900
CDC1-10	reference ^[24]
CDC11-19	In this study

Supplementary Table S3. The annotations of ORFs in novel LOS classes of *C. jejuni*

LOS class	ORF	Products (annotated by prokka)	Length (bp)	
CDC11	8	Lipopolysaccharide heptosyltransferase 1	1,029	
	5	Lipid A biosynthesis lauroyltransferase	879	
	6	hypothetical protein	702	
	18	GalNAc-alpha-(1->4)-GalNAc-alpha-(1->3)- diNAcBac-PP-undecaprenol alpha-1,4-N-acetyl-D-galactosaminyltransferase	1,071	
	39	hypothetical protein	780	
	7	hypothetical protein	933	
	37	hypothetical protein	929	
	41	N,N'-diacetyllegionaminic acid synthase	1,041	
	38	UDP-N-acetylglucosamine 2-epimerase	1,119	
	1	N-acylneuraminate cytidyltransferase	666	
	53	2,3,4,5-tetrahydropyridine-2,6-dicarboxylate N-acetyltransferase	831	
	4	putative glycosyltransferase EpsJ	813	
	60	ADP-heptose--LPS heptosyltransferase 2	944	
	CDC12	8	Lipopolysaccharide heptosyltransferase 1	1,029
		5	Lipid A biosynthesis lauroyltransferase	888
6		hypothetical protein	1,551	
2		hypothetical protein	1,158	
50		hypothetical protein	981	
56		hypothetical protein	1,121	
37		hypothetical protein	891	
N		hypothetical protein	489	
N		hypothetical protein	1,168	
N		hypothetical protein	782	
N		hypothetical protein	1,128	
4		Putative glycosyltransferase EpsH	819	
60	ADP-heptose--LPS heptosyltransferase 2	944		
CDC13	8	Lipopolysaccharide heptosyltransferase 1	1,029	
	5	Lipid A biosynthesis lauroyltransferase	879	
	6	hypothetical protein	702	
	18	GalNAc-alpha-(1->4)-GalNAc-alpha-(1->3)- diNAcBac-PP-undecaprenol alpha-1,4-N-acetyl-D-galactosaminyltransferase	1,071	
	39	hypothetical protein	780	
	7	hypothetical protein	933	
	14	hypothetical protein	1,386	
	1	hypothetical protein	1,074	
	26	hypothetical protein	822	
	4	putative glycosyltransferase EpsJ	810	
	60	ADP-heptose--LPS heptosyltransferase 2	939	

Continued			
LOS class	ORF	Products (annotated by prokka)	Length (bp)
CDC14	8	Lipopolysaccharide heptosyltransferase 1	1,029
	5	Lipid A biosynthesis lauroyltransferase	879
	6	hypothetical protein	702
	18	GalNAc-alpha-(1->4)-GalNAc-alpha-(1->3)- diNAcBac-PP-undecaprenol alpha-1,4-N-acetyl-D-galactosaminyltransferase	1,071
	39	hypothetical protein	780
	7	hypothetical protein	936
	2	Undecaprenyl-phosphate 4-deoxy-4-formamido-L-arabinose transferase	1,584
	26	hypothetical protein	2,022
	4	putative glycosyltransferase EpsJ	810
	60	ADP-heptose--LPS heptosyltransferase 2	939
CDC15	8	Lipopolysaccharide heptosyltransferase 1	1,029
	5	Lipid A biosynthesis lauroyltransferase	879
	6	hypothetical protein	702
	18	GalNAc-alpha-(1->4)-GalNAc-alpha-(1->3)- diNAcBac-PP-undecaprenol alpha-1,4-N-acetyl-D-galactosaminyltransferase	1,027
	39	hypothetical protein	780
	7	hypothetical protein	936
	2	Undecaprenyl-phosphate 4-deoxy-4-formamido-L-arabinose transferase	1,420
	7	hypothetical protein	936
	2	hypothetical protein	1,281
	37	hypothetical protein	944
	41	N,N'-diacetyllegionaminic acid synthase	1,041
	38	UDP-N-acetylglucosamine 2-epimerase	1,119
	1	N-acylneuraminate cytidyltransferase	666
	53	2,3,4,5-tetrahydropyridine-2,6-dicarboxylate N-acetyltransferase	755
4	Undecaprenyl-phosphate 4-deoxy-4-formamido-L-arabinose transferase	758	
60	ADP-heptose--LPS heptosyltransferase 2	944	
CDC16	8	Lipopolysaccharide heptosyltransferase 1	1,029
	5	Lipid A biosynthesis lauroyltransferase	879
	2	hypothetical protein	1,224
	N	hypothetical protein	1,066
	7	hypothetical protein	872
	37	hypothetical protein	918
	41	N,N'-diacetyllegionaminic acid synthase	1,032
	38	UDP-N-acetylglucosamine 2-epimerase	1,116
	1	hypothetical protein	954
	1	N-acylneuraminate cytidyltransferase	663
	26	hypothetical protein	705
	4	putative glycosyltransferase EpsJ	825
	60	ADP-heptose--LPS heptosyltransferase 2	944

			Continued
LOS class	ORF	Products (annotated by prokka)	Length (bp)
CDC17	8	Lipopolysaccharide heptosyltransferase 1	1,029
	5	Lipid A biosynthesis lauroyltransferase	879
	2	hypothetical protein	1,224
	6	hypothetical protein	1,601
	18	GalNAc-alpha-(1->4)-GalNAc-alpha-(1->3)- diNAcBac-PP-undecaprenol alpha-1,4-N-acetyl-D-galactosaminyltransferase	1,068
	13	hypothetical protein	1,148
	2	hypothetical protein	1,203
	1	hypothetical protein	1,058
	1	N-acylneuraminate cytidyltransferase	663
	26	hypothetical protein	843
	4	putative glycosyltransferase EpsJ	825
	60	ADP-heptose--LPS heptosyltransferase 2	944
	CDC18	8	Lipopolysaccharide heptosyltransferase 1
5		Lipid A biosynthesis lauroyltransferase	879
6		hypothetical protein	702
18		GalNAc-alpha-(1->4)-GalNAc-alpha-(1->3)- diNAcBac-PP-undecaprenol alpha-1,4-N-acetyl-D-galactosaminyltransferase	811
39		hypothetical protein	966
7		hypothetical protein	936
26		hypothetical protein	891
4		putative glycosyltransferase EpsJ	810
60		ADP-heptose--LPS heptosyltransferase 2	944
CDC19	8	Lipopolysaccharide heptosyltransferase 1	1,029
	5	Lipid A biosynthesis lauroyltransferase	879
	2	Undecaprenyl-phosphate 4-deoxy-4-formamido-L-arabinose transferase	1,275
	6	hypothetical protein	1,560
	37	hypothetical protein	935
	41	N,N'-diacetyllegionaminic acid synthase	1,041
	38	UDP-N-acetylglucosamine 2-epimerase	1,119
	1	N-acylneuraminate cytidyltransferase	798
	53	Streptogramin A acetyltransferase	615
	4	putative glycosyltransferase EpsJ	813
	60	ADP-heptose--LPS heptosyltransferase 2	944

Supplementary Table S4. The annotations of ORFs in CPS gene clusters of HS2, HS19, and HS41 of *C. jejuni*

CPS types	ORF	Product (annotated by prokka)	Length (bp)
HS2	21	Capsule polysaccharide modification protein	2,067
	1	adenylyl-sulfate kinase	513
	29	sugar nucleotidyltransferase	762
	30	amidotransferase	603
	27	hypothetical protein	2,340
	31	methyltransferase	762
	32	methyltransferase	774
	3	sugar transferase	1,839
	3	sugar transferase	1,878
	9	D-glycero-D-manno-heptose 1-phosphate guanosyltransferase	666
	11	phosphoheptose isomerase	606
	17	D-glycero-D-manno-heptose 7-phosphate kinase	1,020
	110	methyltransferase family protein	852
	54	sugar-nucleotide epimerase/dehydratase	942
	10	GDP-L-fucose synthetase	1,041
	52	hypothetical protein	927
	24	dTDP-4-dehydrorhamnose 3,5-epimerase	546
	14	capsular polysaccharide heptosyltransferase	1,749
	N	sugar transferase	3,096
	N	hypothetical protein	1,107
	22	sugar transferase	1,335
	77	phosphatase	636
	N	aminotransferase	1,230
	78	aminotransferase	1,104
	22	sugar transferase	2,328
	20	UDP-galactopyranose mutase	1,107
	2	sugar transferase	1,224
	16	UDP-glucose 6-dehydrogenase	1,182
	28	sugar transferase	1,635
	12	D-arabinose 5-phosphate isomerase	495
HS19	21	Capsule polysaccharide modification protein	2,067
	1	adenylyl-sulfate kinase	513
	29	sugar nucleotidyltransferase	762
	30	amidotransferase	603
	27	hypothetical protein	2,340
	31	methyltransferase	762
	32	methyltransferase	774
	3	sugar transferase	1,833
	2	hypothetical protein	1,509
	77	phosphatase	633
	78	aminotransferase	1,077
	2	hypothetical protein	2,499
	16	UDP-glucose 6-dehydrogenase	1,176
	28	hypothetical protein	2,124
	12	D-arabinose 5-phosphate isomerase	495

			Continued
CPS types	ORF	Product (annotated by prokka)	Length (bp)
	21	Capsule polysaccharide modification protein	2,067
	46	Na(+)/H(+)-K(+) antiporter GerN	1,254
	47	pyruvate kinase	960
	48	sulfate adenylyltransferase	1,047
	1	adenylyl-sulfate kinase	534
	3	sugar transferase	1,854
	42	hypothetical protein	1,749
	9	D-glycero-D-manno-heptose 1-phosphate guanosyltransferase	666
	11	phosphoheptose isomerase	606
	59	hypothetical protein	1,236
	17	D-glycero-D-manno-heptose 7-phosphate kinase	1,020
	19	NAD-dependent 4,6-dehydratase	1,032
	10	GDP-L-fucose synthase	2,214
	24	dTDP-4-dehydrorhamnose 3,5-epimerase	546
	55	hypothetical protein	1,251
HS41	14	capsular polysaccharide heptosyltransferase	1,608
	20	UDP-galactopyranose mutase	1,131
	61	NAD-dependent 4,6-dehydratase	885
	87	dTDP-4-dehydrorhamnose 3,5-epimerase	630
	84	NAD-dependent 4,6-dehydratase	1,071
	57	Glucose-1-phosphate cytidyltransferase	801
	43	hypothetical protein	2,157
	13	hypothetical protein	1,380
	20	UDP-galactopyranose mutase	1,170
	23	UDP-GlcNAc/Glc 4-epimerase	975
	16	UDP-glucose 6-dehydrogenase	1,299
	15	NAD-dependent 4,6-dehydratase	957
	2	hypothetical protein	1,371
	22	sugar transferase	1,050
	28	sugar transferase	1,632
	12	D-arabinose 5-phosphate isomerase	495