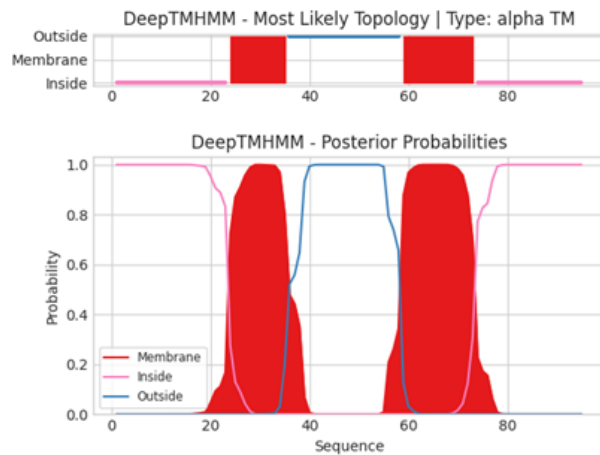


Table S1. The list of the putative protein-coding genes

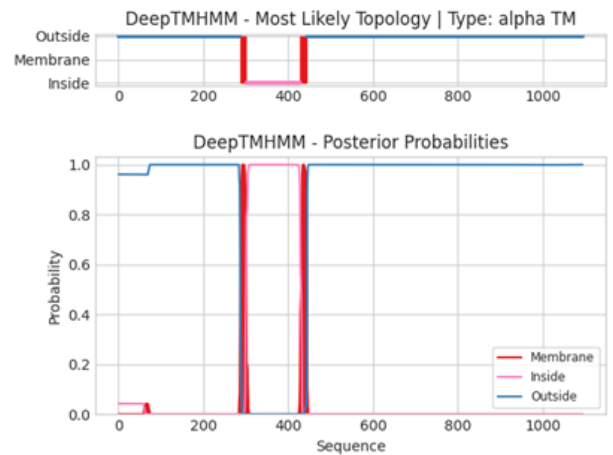
ORF#	Strand	Frame	CDS Position	Translation	Best annotated protein
ORF1	+	1	283..468	186 61	Hypothetical protein
ORF2	+	1	484..762	279 92	Hypothetical protein
ORF3	+	1	769..1152	384 127	Hypothetical protein
ORF4	+	2	1286..1789	504 167	EaA-like protein
ORF5	+	2	1865..2713	849 282	Hypothetical protein
ORF6	+	3	2964..3158	195 64	Hypothetical protein
ORF7	+	3	3261..3680	420 139	Hypothetical protein
ORF8	+	2	3800..5242	1443 480	Large terminase subunit
ORF9	+	3	6261..6500	240 79	Hypothetical protein
ORF10	+	3	6846..7067	222 73	Hypothetical protein
ORF11	+	2	7274..7519	246 81	Hypothetical protein
ORF12	+	1	7567..8961	1395 464	Portal (connector) protein
ORF13	+	1	9733..10680	948 315	Head decoration protein
ORF14	+	3	12195..12632	438 145	Lysozyme
ORF15	+	2	12629..12874	246 81	Holin protein
ORF16	+	3	12849..13343	495 164	Tail protein
ORF17	+	2	14852..15067	216 71	Hypothetical protein
ORF18	+	1	15151..15342	192 63	Hypothetical protein
ORF19	+	2	15560..15796	237 78	Zinc-binding domain of primase-helicase
ORF20	+	2	16244..16534	291 96	Hypothetical protein
ORF21	+	2	16535..16879	345 114	Hypothetical protein
ORF22	+	1	16894..17046	153 50	Hypothetical protein
ORF23	+	1	17062..18462	1401 466	Hypothetical protein
ORF24	+	3	18462..18926	465 154	Capsid decoration protein
ORF25	+	2	18938..20026	1089 362	Major coat protein
ORF26	+	2	20069..20263	195 64	Hypothetical protein
ORF27	+	1	20293..21123	831 276	Hypothetical protein
ORF28	+	1	23863..24150	288 95	Hypothetical protein
ORF29	+	2	24059..24520	462 153	Hypothetical protein
ORF30	+	3	24639..24983	345 114	Hypothetical protein
ORF31	+	3	24987..25403	417 138	Hypothetical protein
ORF32	+	2	25400..25783	384 127	Hypothetical protein
ORF33	+	1	26317..27069	753 250	Major tail subunit
ORF34	+	1	28729..29436	708 235	Hypothetical protein
ORF35	+	3	29436..32717	3282 1093	Tail length tape measure protein
ORF36	+	2	32717..33187	471 156	Minor tail protein
ORF37	+	2	33599..34078	480 159	Tail assembly protein
ORF38	+	3	34026..36506	2481 826	Putative tail protein
ORF39	+	2	36536..39028	2493 830	Putative tail fiber protein
ORF40	+	2	45053..46006	954 317	DNA primase
ORF41	+	1	46003..46320	318 105	Hypothetical protein
ORF42	-	2	5822..5256	567 188	Hypothetical protein
ORF43	-	3	6172..5882	291 96	Hypothetical protein

ORF44	-	2	11678..10815	864 287	Hypothetical protein
ORF45	-	1	12096..11806	291 96	Hypothetical protein
ORF46	-	1	13617..13402	216 71	Hypothetical protein
ORF47	-	3	13972..13748	225 74	Hypothetical protein
ORF48	-	1	14361..13972	390 129	Hypothetical protein
ORF49	-	3	14755..14555	201 66	Holin
ORF50	-	2	21335..21153	183 60	Hypothetical protein
ORF51	-	3	21916..21338	579 192	DNA polymerase III beta subunit
ORF52	-	1	22047..21874	174 57	Hypothetical protein
ORF53	-	2	22391..22044	348 115	Hypothetical protein
ORF54	-	3	23242..22391	852 283	DNA binding protein
ORF55	-	3	23650..23327	324 107	Hypothetical protein
ORF56	-	1	27777..27109	669 222	Gp42
ORF57	-	2	28028..27777	252 83	Hypothetical protein
ORF58	-	3	28510..28025	486 161	HNH endonuclease
ORF59	-	3	39805..39302	504 167	Single-stranded DNA-binding protein
ORF60	-	3	40474..39815	660 219	Recombinase
ORF61	-	1	41454..40498	957 318	Exonuclease
ORF62	-	2	41900..41457	444 147	Hypothetical protein
ORF63	-	3	42364..41948	417 138	Hypothetical protein
ORF64	-	2	44258..42351	1908 635	DNA helicase
ORF65	-	2	45005..44853	153 50	Hypothetical protein
ORF66	-	3	45040..44267	774 257	HNH endonuclease
ORF67	-	1	46296..46021	276 91	ASCH domain-containing protein
ORF68	-	2	47852..46296	1557 518	Hypothetical protein
ORF69	-	3	48085..47849	237 78	Hypothetical protein

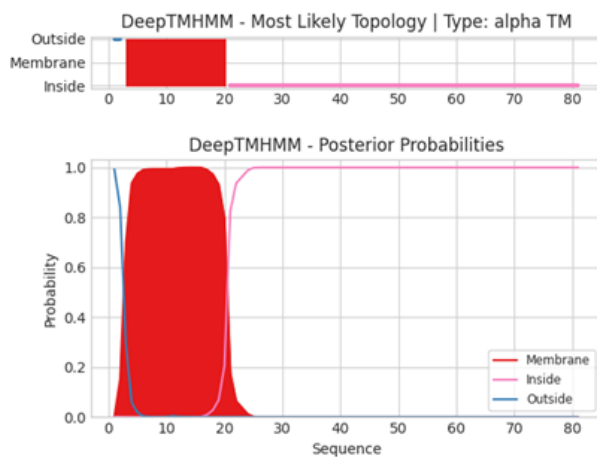
A. Hypothetical protein (ORF 28)



B. Putative tail length tape measure protein (ORF 35)



C. Hypothetical protein (ORF 11)



D. Putative tail protein (ORF 16)

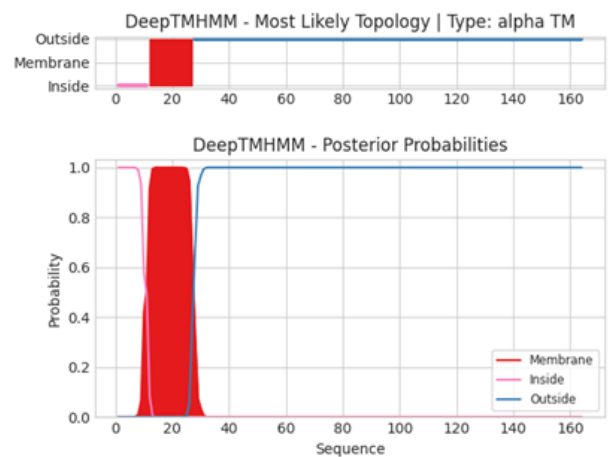


Figure S1. Predicted transmembrane topology using the DeepTMHMM tool of four putative proteins (A: ORF 28, B: ORF 35, C: ORF 11, D: ORF 16). Red blocks represent the predicted transmembrane domains, while the pink line and blue line represent the domains inside and outside the membrane, respectively. The Y-axis represents the prediction probability, while the X-axis represents the amino acids sequence position

Table S2. Pan-genome analysis of ZCKP2 and closely related phages ($S_G \geq 0.5$)
The number of homologs in each column is: 24

Klebsiella phage ZCKP7	Klebsiella phage ZCKP8	Vibrio phage vYD38-A	Aeromonas phage pLS4-Δ	Plfio siphovirus That1.6	Klebsiella phage vB_KpnS_KM5.1	Klebsiella phage BUCT610	Klebsiella phage BUCT541	Klebsiella phage vB_KpnS_ZX4	Klebsiella phage YX2973	Klebsiella virus Kp2811	Klebsiella phage 6991	Klebsiella phage VLCpn13Jf	Klebsiella phage VLCpn13Ic	Klebsiella phage VLCpn13Ia	Klebsiella phage VLCpn13Ib	Klebsiella phage VLCpn13Ic	Klebsiella phage VLCpn13Id
QF401875	MZ440881	NC_021554	NC_042937	OL617041	MW119258	PI-218367	MZ836210	NC_054652	NC_054652	NC_054653	OL362277	QNG02739	QNG02737	QNG02738	QNG02744	QNG02752	QNG02760
PI-UZN98670.1	PI-QYW02909.1	PI-YXP_00812617.2.1	PI-YXP_00961463.2.1	PI-UIW10206.1	PI-OZD26058.1	PI-OWX10301.1	PI-UAW06863.1	PI-YYP_01005451.8.1	PI-YYP_01005440.3.1	PI-YYP_01005445.4.1	PI-URY99566.1	PI-UVX29537.1	PI-UVX30131.1	PI-UVX302015.1	PI-UVX30607.1	PI-UVX31658.1	PI-UVX31697.1
Product: major coat protein	Product: major coat protein	Product: virion structural protein	Product: virion structural protein	Product: protein of unknown function DUF6260	Product: major capsid protein	Product: protein of unknown function DUF2184	Product: coat protein	Product: virion structural protein	Product: virion structural protein	Product: virion structural protein	Product: coat protein	Product: virion structural protein	Product: virion structural protein	Product: virion structural protein	Product: virion structural protein	Product: virion structural protein	Product: virion structural protein
PI-UZN98643.1	PI-QYW02877.1	PI-YXP_00812621.3.1	PI-YXP_00961460.1.1	PI-UIW10248.1	PI-OZD26098.1	PI-OWX10344.1	PI-UAW06819.1	PI-YYP_01005455.9.1	PI-YYP_01005437.0.1	PI-YYP_01005449.2.1	PI-URY99606.1	PI-UVX29578.1	PI-UVX30173.1	PI-UVX30255.1	PI-UVX30648.1	PI-UVX31619.1	PI-UVX31735.1
Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein
PI-UZN98688.1	PI-QYW02928.1	PI-YXP_00812620.3.1	PI-YXP_00961461.1.1	PI-UIW10242.1	PI-OZD26108.1	PI-OWX10271.1	PI-UAW06890.1	PI-YYP_01005449.4.1	PI-YYP_01005437.7.1	PI-YYP_01005448.0.1	PI-URY99538.1	PI-UVX29568.1	PI-UVX30161.1	PI-UVX30264.1	PI-UVX30580.1	PI-UVX31630.1	PI-UVX31665.1
Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein
PI-UZN98651.1	PI-QYW02887.1	PI-YXP_00812620.2.1	PI-YXP_00961461.2.1	PI-UIW10258.1	PI-OZD26109.1	PI-OWX10272.1	PI-UAW06889.1	PI-YYP_01005449.5.1	PI-YYP_01005437.8.1	PI-YYP_01005448.3.1	PI-URY99539.1	PI-UVX29567.1	PI-UVX30160.1	PI-UVX30265.1	PI-UVX30581.1	PI-UVX31631.1	PI-UVX31666.1
Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein
PI-UZN98654.1	PI-QYW02893.1	PI-YXP_00812619.2.1	PI-YXP_00961461.2.1	PI-UIW10203.1	PI-OZD26115.1	PI-OWX10279.1	PI-UAW06885.1	PI-YYP_01005449.7.1	PI-YYP_01005438.1.1	PI-YYP_01005447.8.1	PI-URY99544.1	PI-UVX29561.1	PI-UVX30155.1	PI-UVX30272.1	PI-UVX30585.1	PI-UVX31635.1	PI-UVX31673.1
Product: portal (connector) protein	Product: portal (connector) protein	Product: portal protein	Product: portal protein	Product: protein of unknown function DUF1073	Product: portal protein	Product: portal protein	Product: hypothetical isal protein	Product: portal protein	Product: portal protein	Product: portal protein	Product: portal (connector) protein	Product: portal protein	Product: portal protein	Product: portal protein	Product: portal protein	Product: portal protein	Product: portal protein
PI-UZN98656.1	PI-QYW02895.1	PI-YXP_00812619.6.1	PI-YXP_00961461.8.1	PI-UIW10207.1	PI-OZD26116.1	PI-OWX10280.1	PI-UAW06884.1	PI-YYP_01005449.8.1	PI-YYP_01005438.4.1	PI-YYP_01005447.7.1	PI-URY99545.1	PI-UVX29560.1	PI-UVX30153.1	PI-UVX30273.1	PI-UVX30586.1	PI-UVX31636.1	PI-UVX31674.1
Product: head decoration protein	Product: head decoration protein	Product: head morphogenesis	Product: head morphogenesis	Product: hypothetical isal protein	Product: minor capsid protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: head morphogenesis	Product: head morphogenesis	Product: head morphogenesis	Product: hypothetical isal protein	Product: head morphogenesis	Product: head morphogenesis	Product: head morphogenesis	Product: head morphogenesis	Product: head morphogenesis	Product: head morphogenesis
PI-UZN98690.1	PI-QYW02932.1	PI-YXP_00812619.3.1	PI-YXP_00961462.1.1	PI-UIW10244.1	PI-OZD26120.1	PI-OWX10284.1	PI-UAW06881.1	PI-YYP_01005450.2.1	PI-YYP_01005438.7.1	PI-YYP_01005447.2.1	PI-URY99549.1	PI-UVX29557.1	PI-UVX30150.1	PI-UVX30276.1	PI-UVX30589.1	PI-UVX31640.1	PI-UVX31677.1
Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein
PI-UZN98657.1	PI-QYW02896.1	PI-YXP_00812619.2.1	PI-YXP_00961462.2.1	PI-UIW10247.1	PI-OZD26122.1	PI-OWX10285.1	PI-UAW06880.1	PI-YYP_01005450.3.1	PI-YYP_01005438.8.1	PI-YYP_01005447.1.1	PI-URY99550.1	PI-UVX29556.1	PI-UVX30149.1	PI-UVX30277.1	PI-UVX30591.1	PI-UVX31641.1	PI-UVX31678.1
Product: lysozym ε	Product: lysozym ε	Product: endolysin ε	Product: endolysin ε	Product: hypothetical isal protein	Product: lysozym ε	Product: lysozym ε	Product: lysozym ε	Product: endolysin ε	Product: endolysin ε	Product: endolysin ε	Product: lysozym ε	Product: endolysin ε	Product: endolysin ε	Product: endolysin ε	Product: endolysin ε	Product: endolysin ε	Product: endolysin ε
PI-UZN98693.1	PI-QYW02936.1	PI-YXP_00812618.9.1	PI-YXP_00961462.5.1	PI-UIW10220.1	PI-OZD26047.1	PI-OWX10290.1	PI-UAW06874.1	PI-YYP_01005450.7.1	PI-YYP_01005439.2.1	PI-YYP_01005446.6.1	PI-URY99554.1	PI-UVX29549.1	PI-UVX30143.1	PI-UVX30283.1	PI-UVX30595.1	PI-UVX31647.1	PI-UVX31683.1
Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein
PI-UZN98694.1	PI-QYW02937.1	PI-YXP_00812618.7.1	PI-YXP_00961462.7.1	PI-UIW10267.1	PI-OZD26049.1	PI-OWX10291.1	PI-UAW06873.1	PI-YYP_01005450.8.1	PI-YYP_01005439.3.1	PI-YYP_01005446.5.1	PI-URY99556.1	PI-UVX29547.1	PI-UVX30141.1	PI-UVX30285.1	PI-UVX30596.1	PI-UVX31649.1	PI-UVX31684.1
Product: holin	Product: holin	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein
PI-UZN98660.1	PI-QYW02899.1	PI-YXP_00812618.6.1	PI-YXP_00961462.8.1	PI-UIW10263.1	PI-OZD26050.1	PI-OWX10292.1	PI-UAW06872.1	PI-YYP_01005450.9.1	PI-YYP_01005439.4.1	PI-YYP_01005446.3.1	PI-URY99557.1	PI-UVX29546.1	PI-UVX30140.1	PI-UVX30286.1	PI-UVX30597.1	PI-UVX31650.1	PI-UVX31685.1
Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein
PI-UZN98664.1	PI-QYW02903.1	PI-YXP_00812618.2.1	PI-YXP_00961463.2.1	PI-UIW10266.1	PI-OZD26053.1	PI-OWX10296.1	PI-UAW06868.1	PI-YYP_01005451.3.1	PI-YYP_01005439.8.1	PI-YYP_01005445.9.1	PI-URY99561.1	PI-UVX29542.1	PI-UVX30136.1	PI-UVX30201.1	PI-UVX30601.1	PI-UVX31653.1	PI-UVX31689.1
Product: hypothetical isal protein	Product: hypothetical isal protein	Product: MarR family transcription regulator	Product: MarR family transcription regulator	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: transcription factor	Product: MarR family transcription regulator	Product: MarR family transcription regulator	Product: MarR family transcription regulator	Product: hypothetical isal protein	Product: MarR family transcription regulator	Product: MarR family transcription regulator	Product: MarR family transcription regulator	Product: MarR family transcription regulator	Product: MarR family transcription regulator	Product: MarR family transcription regulator
PI-UZN98666.1	PI-QYW02905.1	PI-YXP_00812618.0.1	PI-YXP_00961463.4.1	PI-UIW10237.1	PI-OZD26055.1	PI-OWX10298.1	PI-UAW06866.1	PI-YYP_01005451.5.1	PI-YYP_01005440.0.1	PI-YYP_01005445.7.1	PI-URY99563.1	PI-UVX29540.1	PI-UVX30134.1	PI-UVX30212.1	PI-UVX30604.1	PI-UVX31655.1	PI-UVX31694.1
Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein
PI-UZN98668.1	PI-QYW02907.1	PI-YXP_00812617.9.1	PI-YXP_00961463.5.1	PI-UIW10205.1	PI-OZD26056.1	PI-OWX10299.1	PI-UAW06865.1	PI-YYP_01005451.6.1	PI-YYP_01005440.1.1	PI-YYP_01005445.6.1	PI-URY99564.1	PI-UVX29539.1	PI-UVX30133.1	PI-UVX30213.1	PI-UVX30605.1	PI-UVX31656.1	PI-UVX31695.1
Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: coat protein	Product: coat protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: coat protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein
PI-UZN98699.1	PI-QYW02942.1	PI-YXP_00812617.0.1	PI-YXP_00961464.3.1	PI-UIW10212.1	PI-OZD26064.1	PI-OWX10308.1	PI-UAW06856.1	PI-YYP_01005452.4.1	PI-YYP_01005440.9.1	PI-YYP_01005444.7.1	PI-URY99573.1	PI-UVX29532.1	PI-UVX30203.1	PI-UVX30222.1	PI-UVX30613.1	PI-UVX31664.1	PI-UVX31702.1
Product: DNA binding protein	Product: putative transcriptional regulator	Product: ParB-like partition protein	Product: ParB-like partition protein	Product: Korf domain protein	Product: putative transcriptional regulator	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: ParB-like partition protein	Product: ParB-like partition protein	Product: ParB-like partition protein	Product: hypothetical isal protein	Product: ParB-like partition protein	Product: ParB-like partition protein	Product: hypothetical isal protein	Product: ParB-like partition protein	Product: ParB-like partition protein	Product: hypothetical isal protein
PI-UZN98674.1	PI-QYW02913.1	PI-YXP_00812616.7.1	PI-YXP_00961464.2.1	PI-UIW10235.1	PI-OZD26060.1	PI-OWX10312.1	PI-UAW06852.1	PI-YYP_01005452.8.1	PI-YYP_01005441.2.1	PI-YYP_01005444.3.1	PI-URY99577.1	PI-UVX29527.1	PI-UVX30199.1	PI-UVX30224.1	PI-UVX30617.1	PI-UVX31589.1	PI-UVX31704.1
Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: head to tail adaptor	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein
PI-UZN98675.1	PI-QYW02915.1	PI-YXP_00812616.6.1	PI-YXP_00961464.8.1	PI-UIW10236.1	PI-OZD26070.1	PI-OWX10313.1	PI-UAW06850.1	PI-YYP_01005453.0.1	PI-YYP_01005441.3.1	PI-YYP_01005444.1.1	PI-URY99579.1	PI-UVX29526.1	PI-UVX30197.1	PI-UVX30226.1	PI-UVX30618.1	PI-UVX31591.1	PI-UVX31705.1
Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: minor capsid protein	Product: hypothetical isal protein	Product: minor capsid protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein
PI-UZN98677.1	PI-QYW02917.1	PI-YXP_00812624.0.1	PI-YXP_00961465.0.1	PI-UIW10234.1	PI-OZD26072.1	PI-OWX10315.1	PI-UAW06848.1	PI-YYP_01005453.2.1	PI-YYP_01005441.5.1	PI-YYP_01005443.9.1	PI-URY99581.1	PI-UVX29524.1	PI-UVX30195.1	PI-UVX30228.1	PI-UVX30620.1	PI-UVX31593.1	PI-UVX31707.1
Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: tail completion protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein
PI-UZN98678.1	PI-QYW02919.1	PI-YXP_00812623.8.1	PI-YXP_00961465.2.1	PI-UIW10213.1	PI-OZD26073.1	PI-OWX10318.1	PI-UAW06845.1	PI-YYP_01005453.4.1	PI-YYP_01005435.2.1	PI-YYP_01005443.7.1	PI-URY99583.1	PI-UVX29523.1	PI-UVX30194.1	PI-UVX30229.1	PI-UVX30621.1	PI-UVX31595.1	PI-UVX31708.1
Product: major tail subunit	Product: major tail subunit	Product: major tail protein	Product: major tail protein	Product: Immune globulin domain protein	Product: major tail subunit	Product: hypothetical isal protein	Product: major tail protein	Product: major tail protein	Product: major tail protein	Product: major tail protein	Product: hypothetical isal protein	Product: major tail protein	Product: major tail protein	Product: major tail protein	Product: major tail protein	Product: major tail protein	Product: major tail protein
PI-UZN98679.1	PI-QYW02920.1	PI-YXP_00812623.4.1	PI-YXP_00961465.6.1	PI-UIW10216.1	PI-OZD26077.1	PI-OWX10324.1	PI-UAW06839.1	PI-YYP_01005454.0.1	PI-YYP_01005435.4.1	PI-YYP_01005443.0.1	PI-URY99588.1	PI-UVX29518.1	PI-UVX30189.1	PI-UVX30234.1	PI-UVX30626.1	PI-UVX31600.1	PI-UVX31714.1
Product: hypothetical isal protein	Product: hypothetical isal protein	Product: DUF624 family protein	Product: DUF624 family protein	Product: protein of unknown function DUF624	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: DUF624 family protein	Product: DUF624 family protein	Product: DUF624 family protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein
PI-UZN98680.1	PI-QYW02921.1	PI-YXP_00812623.3.1	PI-YXP_00961465.7.1	PI-UIW10199.1	PI-OZD26078.1	PI-OWX10325.1	PI-UAW06838.1	PI-YYP_01005454.1.1	PI-YYP_01005435.5.1	PI-YYP_01005442.9.1	PI-URY99589.1	PI-UVX29517.1	PI-UVX30188.1	PI-UVX30235.1	PI-UVX30627.1	PI-UVX31601.1	PI-UVX31715.1
Product: tail length tape measure protein	Product: tail length tape measure protein	Product: tail length tape measure protein	Product: tail length tape measure protein	Product: tail length tape measure protein	Product: tail length tape measure protein	Product: tail length tape measure protein	Product: tail length tape measure protein	Product: tail length tape measure protein	Product: tail length tape measure protein	Product: tail length tape measure protein	Product: tail length tape measure protein	Product: tail length tape measure protein	Product: tail length tape measure protein	Product: tail length tape measure protein	Product: tail length tape measure protein	Product: tail length tape measure protein	Product: tail length tape measure protein
PI-UZN98681.1	PI-QYW02922.1	PI-YXP_00812623.2.1	PI-YXP_00961465.8.1	PI-UIW10225.1	PI-OZD26079.1	PI-OWX10326.1	PI-UAW06837.1	PI-YYP_01005454.2.1	PI-YYP_01005435.6.1	PI-YYP_01005442.8.1	PI-URY99590.1	PI-UVX29515.1	PI-UVX30187.1	PI-UVX30238.1	PI-UVX30629.1	PI-UVX31603.1	PI-UVX31716.1
Product: minor tail protein	Product: minor tail protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: minor tail protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: virion structural protein	Product: virion structural protein	Product: virion structural protein	Product: virion structural protein	Product: virion structural protein	Product: virion structural protein
PI-UZN98682.1	PI-QYW02923.1	PI-YXP_00812623.1.1	PI-YXP_00961465.9.1	PI-UIW10227.1	PI-OZD26080.1	PI-OWX10327.1	PI-UAW06836.1	PI-YYP_01005454.3.1	PI-YYP_01005435.7.1	PI-YYP_01005442.7.1	PI-URY99591.1	PI-UVX29514.1	PI-UVX30186.1	PI-UVX30239.1	PI-UVX30630.1	PI-UVX31604.1	PI-UVX31717.1
Product: hypothetical isal protein	Product: hypothetical isal protein	Product: minor tail protein	Product: minor tail protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: hypothetical isal protein	Product: minor tail protein	Product: minor tail protein	Product: minor tail protein	Product: hypothetical isal protein	Product: minor tail protein	Product: minor tail protein	Product: minor tail protein	Product: minor tail protein	Product: minor tail protein	Product: minor tail protein
PI-UZN98																	

PI-UZN98677.1	PI-QYW02917.1	PI-URY99581.1	PI-QWX10315.1	PI-YP_008126240.1	PI-YP_009614650.1	PI-UVX30228.1	PI-QZD26072.1	PI-UVX29524.1	PI-UVX31593.1	PI-YP_010054439.1	PI-YP_010054532.1	PI-UAW06848.1	PI-UIW10234.1
Product:hypothetical protein	Product:hypothetical protein	Product:hypothetical protein	Product:hypothetical protein	Product:hypothetical protein	Product:hypothetical protein	Product:hypothetical protein	Product:tail completion protein	Product:hypothetical protein	Product:hypothetical protein	Product:hypothetical protein	Product:hypothetical protein	Product:hypothetical protein	Product:hypothetical protein
PI-UZN98678.1	PI-QYW02919.1	PI-URY99583.1	PI-QWX10318.1	PI-YP_008126238.1	PI-YP_009614652.1	PI-UVX30229.1	PI-QZD26073.1	PI-UVX29523.1	PI-UVX31595.1	PI-YP_010054437.1	PI-YP_010054534.1	PI-UAW06845.1	PI-UIW10213.1
Product:major tail subunit	Product:major tail subunit	Product:hypothetical protein	Product:hypothetical protein	Product:major tail protein	Product:major tail protein	Product:major tail protein	Product:major tail subunit	Product:major tail protein	Product:major tail protein	Product:major tail protein	Product:major tail protein	Product:major tail protein	Product:Immunoglobulin domain protein
PI-UZN98679.1	PI-QYW02920.1	PI-URY99588.1	PI-QWX10324.1	PI-YP_008126234.1	PI-YP_009614656.1	PI-UVX30234.1	PI-QZD26077.1	PI-UVX29518.1	PI-UVX31600.1	PI-YP_010054430.1	PI-YP_010054540.1	PI-UAW06839.1	PI-UIW10216.1
Product:hypothetical protein	Product:hypothetical protein	Product:hypothetical protein	Product:hypothetical protein	Product:DUF6246 family protein	Product:DUF6246 family protein	Product:hypothetical protein	Product:hypothetical protein	Product:hypothetical protein	Product:hypothetical protein	Product:DUF6246 family protein	Product:DUF6246 family protein	Product:hypothetical protein	Product:protein of unknown function DUF6246
PI-UZN98680.1	PI-QYW02921.1	PI-URY99589.1	PI-QWX10325.1	PI-YP_008126233.1	PI-YP_009614657.1	PI-UVX30235.1	PI-QZD26078.1	PI-UVX29517.1	PI-UVX31601.1	PI-YP_010054429.1	PI-YP_010054541.1	PI-UAW06838.1	PI-UIW10199.1
Product:tail length tape measure protein	Product:tail length tape measure protein	Product:tail length tape measure protein	Product:tail length tape measure protein	Product:tail length tape measure protein	Product:tail length tape measure protein	Product:tail length tape measure protein	Product:putative tail protein	Product:tail length tape measure protein	Product:tail length tape measure protein	Product:tail length tape measure protein	Product:tail length tape measure protein	Product:tail length tape measure protein	Product:tape measure protein
PI-UZN98681.1	PI-QYW02922.1	PI-URY99590.1	PI-QWX10326.1	PI-YP_008126232.1	PI-YP_009614658.1	PI-UVX30238.1	PI-QZD26079.1	PI-UVX29515.1	PI-UVX31603.1	PI-YP_010054428.1	PI-YP_010054542.1	PI-UAW06837.1	PI-UIW10225.1
Product:minor tail protein	Product:minor tail protein	Product:hypothetical protein	Product:hypothetical protein	Product:hypothetical protein	Product:hypothetical protein	Product:virion structural protein	Product:minor tail protein	Product:virion structural protein	Product:virion structural protein	Product:hypothetical protein	Product:hypothetical protein	Product:hypothetical protein	Product:hypothetical protein
PI-UZN98682.1	PI-QYW02923.1	PI-URY99591.1	PI-QWX10327.1	PI-YP_008126231.1	PI-YP_009614659.1	PI-UVX30239.1	PI-QZD26080.1	PI-UVX29514.1	PI-UVX31604.1	PI-YP_010054427.1	PI-YP_010054543.1	PI-UAW06836.1	PI-UIW10227.1
Product:hypothetical protein	Product:hypothetical protein	Product:hypothetical protein	Product:hypothetical protein	Product:minor tail protein	Product:minor tail protein	Product:minor tail protein	Product:hypothetical protein	Product:minor tail protein	Product:minor tail protein	Product:minor tail protein	Product:minor tail protein	Product:hypothetical protein	Product:hypothetical protein
PI-UZN98684.1	PI-QYW02925.1	PI-URY99593.1	PI-QWX10329.1	PI-YP_008126229.1	PI-YP_009614661.1	PI-UVX30241.1	PI-QZD26082.1	PI-UVX29512.1	PI-UVX31606.1	PI-YP_010054426.1	PI-YP_010054545.1	PI-UAW06834.1	PI-UIW10198.1
Product:putative tail protein	Product:putative tail protein	Product:hypothetical protein	Product:hypothetical protein	Product:tail protein	Product:tail protein	Product:tail protein	Product:tail protein	Product:tail protein	Product:tail protein	Product:tail protein	Product:tail protein	Product:hypothetical protein	Product:hypothetical protein
PI-UZN98704.1	PI-QYW02950.1	PI-URY99597.1	PI-QWX10332.1	PI-YP_008126226.1	PI-YP_009614664.1	PI-UVX30243.1	PI-QZD26084.1	PI-UVX29591.1	PI-UVX31608.1	PI-YP_010054424.1	PI-YP_010054547.1	PI-UAW06832.1	PI-UIW10224.1
Product:single-stranded DNA-binding protein	Product:single-stranded DNA-binding protein	Product:hypothetical protein	Product:single-stranded DNA-binding protein	Product:single-stranded DNA-binding protein	Product:single-stranded DNA-binding protein	Product:single-stranded DNA-binding protein	Product:single-stranded DNA-binding protein	Product:single-stranded DNA-binding protein	Product:single-stranded DNA-binding protein	Product:single-stranded DNA-binding protein	Product:single-stranded DNA-binding protein	Product:single-stranded binding protein	Product:single-stranded binding protein family protein

Table S4. Pan-genome analysis of ZCKP2 and closely related phages (SG ≥ 0.7)

The number of homologs in each column is: 54

Klebsiella phage ZCKP2 OP481875	Klebsiella phage ZCKP8 MZ440881	Klebsiella phage 6991 OL362277
<u>PI:UZN98670.1</u> Product:major coat protein	<u>PI:QYW02909.1</u> Product:major coat protein	<u>PI:URY99566.1</u> Product:coat protein
<u>PI:UZN98650.1</u> Product:large terminase subunit	<u>PI:QYW02886.1</u> Product:large terminase subunit	<u>PI:URY99536.1</u> Product:terminase large subunit
<u>PI:UZN98704.1</u> Product:single-stranded DNA-binding protein	<u>PI:QYW02950.1</u> Product:single-stranded DNA-binding protein	<u>PI:URY99597.1</u> Product:hypothetical protein
<u>PI:UZN98642.1</u> Product:hypothetical protein	<u>PI:QYW02876.1</u> Product:hypothetical protein	<u>PI:URY99605.1</u> Product:hypothetical protein
<u>PI:UZN98643.1</u> Product:hypothetical protein	<u>PI:QYW02877.1</u> Product:hypothetical protein	<u>PI:URY99606.1</u> Product:hypothetical protein
<u>PI:UZN98645.1</u> Product:hypothetical protein	<u>PI:QYW02878.1</u> Product:hypothetical protein	<u>PI:URY99607.1</u> Product:hypothetical protein
<u>PI:UZN98644.1</u> Product:minor tail protein	<u>PI:QYW02879.1</u> Product:hypothetical protein	<u>PI:URY99608.1</u> Product:hypothetical protein
<u>PI:UZN98646.1</u> Product:EaA-like protein	<u>PI:QYW02880.1</u> Product:hypothetical protein	<u>PI:URY99609.1</u> Product:hypothetical protein
<u>PI:UZN98647.1</u> Product:hypothetical protein	<u>PI:QYW02882.1</u> Product:hypothetical protein	<u>PI:URY99611.1</u> Product:EaA protein
<u>PI:UZN98648.1</u> Product:hypothetical protein	<u>PI:QYW02884.1</u> Product:hypothetical protein	<u>PI:URY99614.1</u> Product:hypothetical protein
<u>PI:UZN98649.1</u> Product:hypothetical protein	<u>PI:QYW02885.1</u> Product:hypothetical protein	<u>PI:URY99535.1</u> Product:hypothetical protein
<u>PI:UZN98688.1</u> Product:hypothetical protein	<u>PI:QYW02928.1</u> Product:hypothetical protein	<u>PI:URY99538.1</u> Product:hypothetical protein
<u>PI:UZN98651.1</u> Product:hypothetical protein	<u>PI:QYW02887.1</u> Product:hypothetical protein	<u>PI:URY99539.1</u> Product:hypothetical protein
<u>PI:UZN98654.1</u> Product:portal (connector) protein	<u>PI:QYW02893.1</u> Product:portal (connector) protein	<u>PI:URY99544.1</u> Product:portal (connector) protein

<u>PI:UZN98656.1</u> <u>Product:head decoration protein</u>	<u>PI:QYW02895.1</u> <u>Product:head decoration protein</u>	<u>PI:URY99545.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98689.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02930.1</u> <u>Product:hypothetical protein</u>	<u>PI:URY99547.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98690.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02932.1</u> <u>Product:hypothetical protein</u>	<u>PI:URY99549.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98657.1</u> <u>Product:lysozyme</u>	<u>PI:QYW02896.1</u> <u>Product:lysozyme</u>	<u>PI:URY99550.1</u> <u>Product:lysozyme R</u>
<u>PI:UZN98658.1</u> <u>Product:holin protein</u>	<u>PI:QYW02897.1</u> <u>Product:putative holin</u>	<u>PI:URY99551.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98659.1</u> <u>Product:tail protein</u>	<u>PI:QYW02898.1</u> <u>Product:tail protein</u>	<u>PI:URY99552.1</u> <u>Product:lysin</u>
<u>PI:UZN98693.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02936.1</u> <u>Product:hypothetical protein</u>	<u>PI:URY99554.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98694.1</u> <u>Product:holin</u>	<u>PI:QYW02937.1</u> <u>Product:holin</u>	<u>PI:URY99556.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98660.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02899.1</u> <u>Product:hypothetical protein</u>	<u>PI:URY99557.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98661.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02900.1</u> <u>Product:hypothetical protein</u>	<u>PI:URY99558.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98662.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02901.1</u> <u>Product:hypothetical protein</u>	<u>PI:URY99559.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98663.1</u> <u>Product:zinc-binding domain of primase-helicase</u>	<u>PI:QYW02902.1</u> <u>Product:zinc-binding domain of primase-helicase</u>	<u>PI:URY99560.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98664.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02903.1</u> <u>Product:hypothetical protein</u>	<u>PI:URY99561.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98665.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02904.1</u> <u>Product:hypothetical protein</u>	<u>PI:URY99562.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98666.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02905.1</u> <u>Product:hypothetical protein</u>	<u>PI:URY99563.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98668.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02907.1</u> <u>Product:hypothetical protein</u>	<u>PI:URY99564.1</u> <u>Product:coat protein</u>
<u>PI:UZN98669.1</u> <u>Product:capsid decoration protein</u>	<u>PI:QYW02908.1</u> <u>Product:capsid decoration protein</u>	<u>PI:URY99565.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98671.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02910.1</u> <u>Product:hypothetical protein</u>	<u>PI:URY99567.1</u> <u>Product:hypothetical protein</u>

<u>PI:UZN98672.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02911.1</u> <u>Product:hypothetical protein</u>	<u>PI:URY99568.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98695.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02938.1</u> <u>Product:hypothetical protein</u>	<u>PI:URY99569.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98696.1</u> <u>Product:DNA polymerase III beta subunit</u>	<u>PI:QYW02939.1</u> <u>Product:DNA polymerase III beta subunit</u>	<u>PI:URY99570.1</u> <u>Product:DNA polymerase III beta subunit</u>
<u>PI:UZN98697.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02940.1</u> <u>Product:hypothetical protein</u>	<u>PI:URY99571.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98698.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02941.1</u> <u>Product:hypothetical protein</u>	<u>PI:URY99572.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98699.1</u> <u>Product:DNA binding protein</u>	<u>PI:QYW02942.1</u> <u>Product:putative transcriptional regulator</u>	<u>PI:URY99573.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98700.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02944.1</u> <u>Product:hypothetical protein</u>	<u>PI:URY99575.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98673.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02912.1</u> <u>Product:hypothetical protein</u>	<u>PI:URY99576.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98674.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02913.1</u> <u>Product:hypothetical protein</u>	<u>PI:URY99577.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98675.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02915.1</u> <u>Product:hypothetical protein</u>	<u>PI:URY99579.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98676.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02916.1</u> <u>Product:hypothetical protein</u>	<u>PI:URY99580.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98677.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02917.1</u> <u>Product:hypothetical protein</u>	<u>PI:URY99581.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98678.1</u> <u>Product:major tail subunit</u>	<u>PI:QYW02919.1</u> <u>Product:major tail subunit</u>	<u>PI:URY99583.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98701.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02946.1</u> <u>Product:hypothetical protein</u>	<u>PI:URY99584.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98702.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02947.1</u> <u>Product:hypothetical protein</u>	<u>PI:URY99585.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98679.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02920.1</u> <u>Product:hypothetical protein</u>	<u>PI:URY99588.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98680.1</u> <u>Product:tail length tape measure protein</u>	<u>PI:QYW02921.1</u> <u>Product:tail length tape measure protein</u>	<u>PI:URY99589.1</u> <u>Product:tail length tape-measure protein T</u>

<u>PI:UZN98681.1</u> <u>Product:minor tail protein</u>	<u>PI:QYW02922.1</u> <u>Product:minor tail protein</u>	<u>PI:URY99590.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98682.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02923.1</u> <u>Product:hypothetical protein</u>	<u>PI:URY99591.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98683.1</u> <u>Product:tail assembly protein</u>	<u>PI:QYW02924.1</u> <u>Product:tail assembly protein</u>	<u>PI:URY99592.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98684.1</u> <u>Product:putative tail protein</u>	<u>PI:QYW02925.1</u> <u>Product:putative tail protein</u>	<u>PI:URY99593.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98685.1</u> <u>Product:putative tail fiber protein</u>	<u>PI:QYW02926.1</u> <u>Product:tail fiber protein</u>	<u>PI:URY99594.1</u> <u>Product:hypothetical protein</u>

Table S5. Pan-genome analysis of ZCKP2 and closely related phages (SG ≥ 0.9)

The number of homologs in each column is: 69

<u>Klebsiella phage ZCKP2</u> <u>OP481875</u>	<u>Klebsiella phage ZCKP8</u> <u>MZ440881</u>
<u>PI:UZN98670.1</u> Product:major coat protein	<u>PI:QYW02909.1</u> Product:major coat protein
<u>PI:UZN98650.1</u> Product:large terminase subunit	<u>PI:QYW02886.1</u> Product:large terminase subunit
<u>PI:UZN98704.1</u> Product:single-stranded DNA-binding protein	<u>PI:QYW02950.1</u> Product:single-stranded DNA-binding protein
<u>PI:UZN98696.1</u> Product:DNA polymerase III beta subunit	<u>PI:QYW02939.1</u> Product:DNA polymerase III beta subunit
<u>PI:UZN98642.1</u> Product:hypothetical protein	<u>PI:QYW02876.1</u> Product:hypothetical protein
<u>PI:UZN98643.1</u> Product:hypothetical protein	<u>PI:QYW02877.1</u> Product:hypothetical protein
<u>PI:UZN98645.1</u> Product:hypothetical protein	<u>PI:QYW02878.1</u> Product:hypothetical protein
<u>PI:UZN98644.1</u> Product:minor tail protein	<u>PI:QYW02879.1</u> Product:hypothetical protein
<u>PI:UZN98646.1</u> Product:EaA-like protein	<u>PI:QYW02880.1</u> Product:hypothetical protein
<u>PI:UZN98647.1</u> Product:hypothetical protein	<u>PI:QYW02882.1</u> Product:hypothetical protein
<u>PI:UZN98648.1</u> Product:hypothetical protein	<u>PI:QYW02884.1</u> Product:hypothetical protein
<u>PI:UZN98649.1</u> Product:hypothetical protein	<u>PI:QYW02885.1</u> Product:hypothetical protein
<u>PI:UZN98688.1</u> Product:hypothetical protein	<u>PI:QYW02928.1</u> Product:hypothetical protein
<u>PI:UZN98651.1</u> Product:hypothetical protein	<u>PI:QYW02887.1</u> Product:hypothetical protein
<u>PI:UZN98652.1</u> Product:hypothetical protein	<u>PI:QYW02890.1</u> Product:hypothetical protein

<u>PI:UZN98653.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02892.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98654.1</u> <u>Product:portal (connector) protein</u>	<u>PI:QYW02893.1</u> <u>Product:portal (connector) protein</u>
<u>PI:UZN98655.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02894.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98656.1</u> <u>Product:head decoration protein</u>	<u>PI:QYW02895.1</u> <u>Product:head decoration protein</u>
<u>PI:UZN98689.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02930.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98690.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02932.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98657.1</u> <u>Product:lysozyme</u>	<u>PI:QYW02896.1</u> <u>Product:lysozyme</u>
<u>PI:UZN98658.1</u> <u>Product:holin protein</u>	<u>PI:QYW02897.1</u> <u>Product:putative holin</u>
<u>PI:UZN98659.1</u> <u>Product:tail protein</u>	<u>PI:QYW02898.1</u> <u>Product:tail protein</u>
<u>PI:UZN98691.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02933.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98692.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02935.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98693.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02936.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98694.1</u> <u>Product:holin</u>	<u>PI:QYW02937.1</u> <u>Product:holin</u>
<u>PI:UZN98660.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02899.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98661.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02900.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98662.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02901.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98663.1</u> <u>Product:zinc-binding domain of primase-helicase</u>	<u>PI:QYW02902.1</u> <u>Product:zinc-binding domain of primase-helicase</u>
<u>PI:UZN98664.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02903.1</u> <u>Product:hypothetical protein</u>

<u>PI:UZN98665.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02904.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98666.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02905.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98667.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02906.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98668.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02907.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98669.1</u> <u>Product:capsid decoration protein</u>	<u>PI:QYW02908.1</u> <u>Product:capsid decoration protein</u>
<u>PI:UZN98671.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02910.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98672.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02911.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98695.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02938.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98697.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02940.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98698.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02941.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98699.1</u> <u>Product:DNA binding protein</u>	<u>PI:QYW02942.1</u> <u>Product:putative transcriptional regulator</u>
<u>PI:UZN98700.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02944.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98673.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02912.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98674.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02913.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98675.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02915.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98676.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02916.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98677.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02917.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98678.1</u> <u>Product:major tail subunit</u>	<u>PI:QYW02919.1</u> <u>Product:major tail subunit</u>

<u>PI:UZN98701.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02946.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98702.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02947.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98703.1</u> <u>Product:HNH endonuclease</u>	<u>PI:QYW02948.1</u> <u>Product:HNH-endonuclease</u>
<u>PI:UZN98679.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02920.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98680.1</u> <u>Product:tail length tape measure protein</u>	<u>PI:QYW02921.1</u> <u>Product:tail length tape measure protein</u>
<u>PI:UZN98681.1</u> <u>Product:minor tail protein</u>	<u>PI:QYW02922.1</u> <u>Product:minor tail protein</u>
<u>PI:UZN98682.1</u> <u>Product:hypothetical protein</u>	
<u>PI:UZN98683.1</u> <u>Product:tail assembly protein</u>	<u>PI:QYW02924.1</u> <u>Product:tail assembly protein</u>
<u>PI:UZN98684.1</u> <u>Product:putative tail protein</u>	<u>PI:QYW02925.1</u> <u>Product:putative tail protein</u>
<u>PI:UZN98685.1</u> <u>Product:putative tail fiber protein</u>	<u>PI:QYW02926.1</u> <u>Product:tail fiber protein</u>
<u>PI:UZN98705.1</u> <u>Product:recombinase</u>	<u>PI:QYW02951.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98706.1</u> <u>Product:exonuclease</u>	<u>PI:QYW02952.1</u> <u>Product:exonuclease</u>
<u>PI:UZN98707.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02953.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98708.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02954.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98709.1</u> <u>Product:HNH endonuclease</u>	<u>PI:QYW02956.1</u> <u>Product:putative endonuclease protein</u>
<u>PI:UZN98686.1</u> <u>Product:DNA primase</u>	<u>PI:QYW02927.1</u> <u>Product:DNA primase</u>
<u>PI:UZN98711.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02958.1</u> <u>Product:hypothetical protein</u>
<u>PI:UZN98712.1</u> <u>Product:hypothetical protein</u>	<u>PI:QYW02959.1</u> <u>Product:hypothetical protein</u>

Table S6. Pan-genome analysis of ZCKP2 and phages of *Drexlerviridae* family (SG ≥ 0.05)

The number of homologs in each column is:7

Klebsiella phage ZCKP2 OP481875	Klebsiella phage MezzoGao NC_047850	Klebsiella phage KpKT21phi1 NC_048143	Klebsiella phage vB_KpnS_15-38_KLPPQU149 NC_049842	Klebsiella phage GML-KpCol1 NC_047907
PI:UZN98704.1 Product:single-stranded DNA-binding protein	PI:YP_009792118.1 Product:single-stranded DNA binding protein	PI:YP_009818761.1 Product:hypothetical protein	PI:YP_009903159.1 Product:hypothetical protein	PI:YP_009796908.1 Product:hypothetical protein
PI:UZN98701.1 Product:hypothetical protein	PI:YP_009792141.1 Product:DNA methyltransferase	PI:YP_009818815.1 Product:DNA methyltransferase	PI:YP_009903104.1 Product:DNA methyltransferase	PI:YP_009796964.1 Product:DNA methyltransferase
PI:UZN98705.1 Product:recombinase	PI:YP_009792119.1 Product:Erf-like ssDNA annealing protein	PI:YP_009818760.1 Product:Erf-like ssDNA annealing protein	PI:YP_009903160.1 Product:Erf-like ssDNA annealing protein	PI:YP_009796907.1 Product:Erf-like ssDNA annealing protein
PI:UZN98706.1 Product:exonuclease	PI:YP_009792120.1 Product:exonuclease VIII	PI:YP_009818759.1 Product:exonuclease VIII	PI:YP_009903161.1 Product:exonuclease VIII	PI:YP_009796906.1 Product:exonuclease VIII
PI:UZN98708.1 Product:hypothetical protein	PI:YP_009792124.1 Product:VRR-NUC domain-containing protein	PI:YP_009818831.1 Product:VRR-NUC domain-containing protein	PI:YP_009903088.1 Product:VRR-NUC domain-containing protein	PI:YP_009796902.1 Product:VRR-NUC domain-containing protein
PI:UZN98686.1 Product:DNA primase	PI:YP_009792121.1 Product:DNA primase	PI:YP_009818758.1 Product:DNA primase	PI:YP_009903162.1 Product:DNA primase	PI:YP_009796905.1 Product:DNA primase
PI:UZN98711.1 Product:hypothetical protein	PI:YP_009792137.1 Product:DNA helicase	PI:YP_009818819.1 Product:DNA helicase	PI:YP_009903100.1 Product:DNA helicase	PI:YP_009796968.1 Product:DNA helicase

Table S7. Number of predicted orthologues genes between phage ZCKP2 and other phages

Classif ication	Accession#	Name	ViPTree <i>S_G</i>	Orthologs by CoreGenes 0.5						
				24	31	54	69	7	1	0
Unclassified Siphoviruses	MZ440881	Klebsiella phage_ZCKP8	0.9277							
	OL362277	Klebsiella phage_6991	0.7025							
	MZ318367	Klebsiella phage_BUCT610	0.6553							
	NC_021534	Vibrio phage pYD38-A	0.6547							
	NC_042037	Aeromonas phage pIS4-A	0.6537							
	ON602738	Klebsiella phage_VLCpiS13a	0.652							
	MW119258	Klebsiella phage__vB_KpnS_MK54	0.6262							
	ON602730	Klebsiella phage_VLCpiS13f	0.6236							
	ON602759	Klebsiella phage_VLCpiS13e	0.6022							
	NC_054653	Klebsiella virus KpV2811	0.6018							
	NC_054654	Klebsiella phage vB_KpnS_ZX4	0.6013							
	MZ836210	Klebsiella phage_BUCT541	0.5972							
	OL617041	Siphovirus_Tbat1_6	0.5934							
	ON602737	Klebsiella phage_VLCpiS13c	0.5684							
	ON602760	Klebsiella phage_VLCpiS13d	0.5336							
	ON602744	Klebsiella phage_VLCpiS13b	0.5028							
	NC_054652	Klebsiella phage YX3973	0.4959							
<i>Drexlerviridae</i>	NC_047850	Klebsiella phage MezzoGao	0.0558							
	NC_048143	Klebsiella phage KpKT21phi1	0.0522							
	NC_049842	Klebsiella phage vB_KpnS_15-38_KLPPOU149	0.0514							
	NC_047907	Klebsiella phage GML-KpCol1	0.0519							
Myov.	NC_049462	Klebsiella phage Magnus	Outgroups							
	NC_047901	Klebsiella phage Menlow								
Podov.	NC_047748	Klebsiella phage phiBO1E								
	NC_047771	Klebsiella phage vB_KpnP_KpV763								