
Supplementary information

**A new paradigm for outer membrane
protein biogenesis in the Bacteroidota**

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Supplementary Information For:

A new paradigm for outer membrane protein biogenesis in the Bacteroidota

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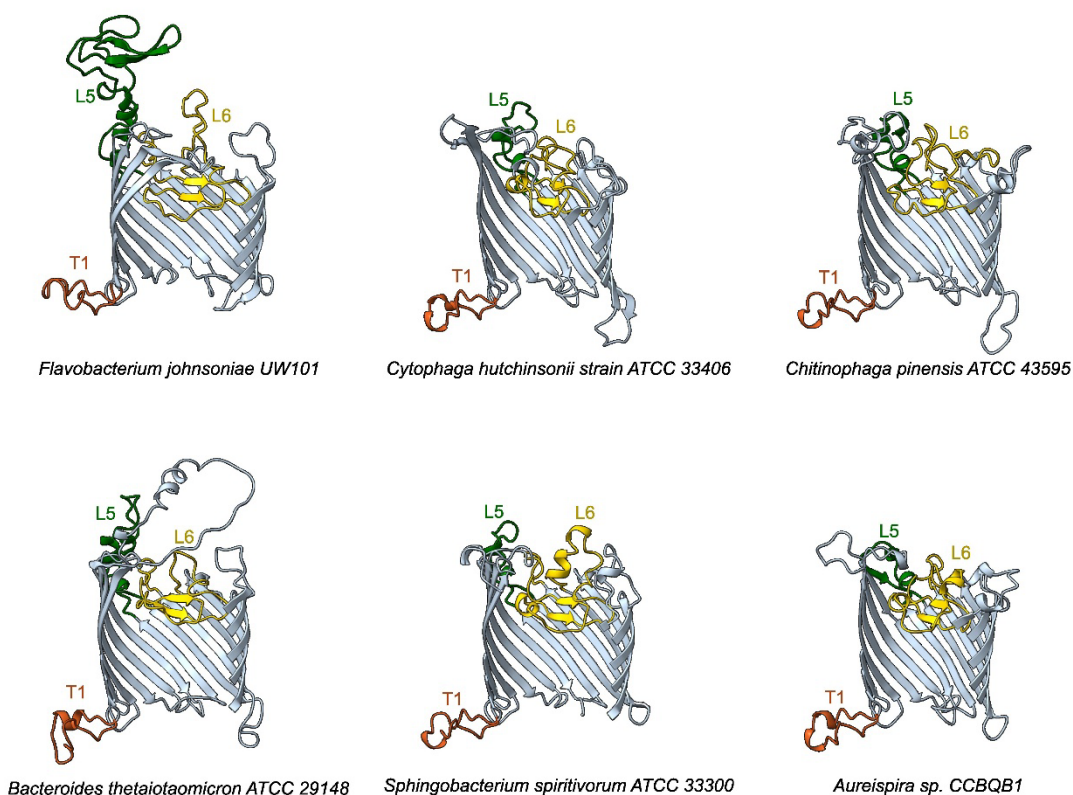
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Supplementary Figure 1 | AlphaFold predictions of the structure of BamA barrels from representative Bacteroidota. The proteins analyzed are from selected species in Extended Data Table 2 and are compared with the experimental structure of the *F. johnsoniae* protein. Loop 5 (L5) is shown in green, loop 6 (L6) in yellow, and turn 1 (T1) in orange. The strands closest to the viewer have been removed to reveal Loop 6.

Supplementary Figure 2 | Uncropped gels and immunoblots. See separate source data file Supplementary Figure 1.

Supplementary Table 1 | Accession numbers of BamA, BamD, BamG, and BamH proteins analyzed in Extended Data Table 2.

Species	BamA	BamD	BamG	BamH
<i>Flavobacterium johnsoniae</i> UW101	Fjoh_1690	Fjoh_3469	Fjoh_1412; Fjoh_1686	Fjoh_0823, Fjoh_1685
<i>Capnocytophaga canimorsus</i> Cc5	Ccan_09070	Ccan_09420	Ccan_02540	Ccan_06570
<i>Riemerella anatipestifer</i> DSM 15868	RA0C_1327	RA0C_1616	RA0C_0295	RA0C_1937
<i>Cytophaga hutchinsonii</i> ATCC 33406	CHU_3412	CHU_3017	CHU_3271	CHU_3837
<i>Thermoflexibacter ruber</i> ATCC 23103	SAMN04488541_1004111	SAMN04488541_1009104	SAMN04488541_100378	SAMN04488541_103619
<i>Chitinophaga pinensis</i> ATCC 43595	Cpin_3279	Cpin_6968	Cpin_1839	Cpin_1840
<i>Bacteroides thetaiotaomicron</i> ATCC 29148	BT_3725	BT_0573	BT_4367, BT_1785	BT_4306, BT_1786
<i>Porphyromonas gingivalis</i> W83	PG_0191	PG_1215	PG_0448	PG_1835
<i>Prevotella intermedia</i> ATCC 25611	BWX39_00670	BWX39_04985	BWX39_09620	BWX39_09115
<i>Sphingobacterium spiritivorum</i> ATCC 33300	HMPREF0765_4825	HMPREF0765_0270	HMPREF0765_2828	HMPREF0765_0180
<i>Aureispira</i> sp. CCB-QB1	WP_052599347.1	WP_052598710.1	WP_052595627.1	WP_081909491.1
<i>Gracilimonas mengyensis</i> DSM 21985	SAMN06265219_11353	SAMN06265219_101289	SAMN06265219_106164	SAMN06265219_103120, SAMN06265219_106163
<i>Ignavibacterium album</i> JCM 16511	IALB_0497	IALB_3077	IALB_1455	IALB_1454
<i>Salinibacter ruber</i> DSM 13855	SRU_1846	SRU_2073	SRU_0789	SRU_0790
<i>Chlorobaculum tepidum</i> DSM 12025	CT0266	CT0017		
<i>Fibrobacter succinogenes</i> S85	FSU_2654	WP_041917861.1	FSU_1156	FSU_1157
<i>Gemmatimonas aurantiaca</i> strain DSM 14586	GAU_1585	GAU_1963	GAU_1453	GAU_1452
<i>Caldithrix abyssi</i> DSM 13497	Calab_3667	Cabys_2838	Cabys_4206, Cabys_3919	Cabys_4207

Supplementary Table 2 | Bacterial strains used in this study.

Strain	Genotype and Details	Reference
<i>E. coli</i>		
NEB® 5-α	<i>fhuA2 Δ(argF-lacZ)U169 phoA glnV44 Φ80 Δ(lacZ)M15 gyrA96 recA1 relA1 endA1 thi-1 hsdR17</i>	NEB
MG1655	<i>F⁻ lambda⁻ ilvG⁻ rfb⁻50 rph-1</i>	67
HB101 Helper	Strain used with pRK2013 for triparental conjugation	36
BL21 (DE3)	<i>F⁻ ompT hsdS_B (r_B⁻, m_B⁻) galdcmrne131 (DE3)</i>	Invitrogen
<i>F. johnsoniae</i>		
UW101	Wild-type <i>F. johnsoniae</i> strain	46
FI_058	UW101 $\Delta porV \Delta plug$	15
XLFJ_000	UW101 $\Delta fjoh_1945$	This study
XLFJ_963	$\Delta fjoh_1945$ <i>twinstrep-bamA</i> (<i>fjoh1690</i>)	This study
XLFJ_988	$\Delta fjoh_1945$ <i>twinstrep-bamA</i> $\Delta bamP$ (<i>fjoh_1771</i>)	This study
XLFJ_998	$\Delta fjoh_1945$ <i>twinstrep-bamA</i> $\Delta bamM$ (<i>fjoh_0050</i>)	This study
XLFJ_1016	$\Delta fjoh_1945$ <i>twinstrep-bamA</i> $\Delta bamP$ -P3 (<i>fjoh_1769-1771</i>)	This study
XLFJ_1027	$\Delta fjoh_1945$ <i>twinstrep-bamA</i> $\Delta bamP$ -P3 $\Delta bamP4$ (<i>fjoh_2401</i>)	This study
XLFJ_1078	$\Delta fjoh_1945$ <i>twinstrep-bamA</i> <i>bamG</i> -SW3-α (<i>fjoh_1412</i>)	This study
XLFJ_1090	$\Delta fjoh_1945$ <i>twinstrep-bamA</i> $\Delta bamP$ $\Delta bamM$	This study
XLFJ_1093	$\Delta fjoh_1945$ <i>twinstrep-bamA</i> $\Delta bamP4$	
XLFJ_1095	<i>tetR</i> - <i>P_{ompA}</i> <i>P_{ompA}induc</i> - <i>NanoLuc</i>	This study
XLFJ_1100	<i>tetR</i> - <i>P_{ompA}</i> <i>P_{fjoh_0824}induc</i> - <i>NanoLuc</i>	This study
XLFJ_1115	$\Delta fjoh_1945$ <i>twinstrep-bamA</i> <i>tetR</i> - <i>P_{ompA}</i> <i>P_{ompA}induc</i> - <i>bamG</i> -SW3-α $\Delta bamG$	This study
XLFJ_1122	$\Delta fjoh_1945$ <i>twinstrep-bamA</i> <i>tetR</i> - <i>P_{ompA}</i> <i>P_{ompA}induc</i> - <i>bamH</i> $\Delta bamH$	This study
XLFJ_1129	$\Delta fjoh_1945$ <i>tetR</i> - <i>P_{ompA}</i> <i>P_{ompA}induc</i> - <i>twinstrep-bamA</i> $\Delta bamA$ <i>bamG</i> -SW3-α	This study
XLFJ_1130	$\Delta fjoh_1945$ <i>twinstrep-bamA</i> <i>tetR</i> - <i>P_{ompA}</i> <i>P_{ompA}induc</i> - <i>bamH</i> $\Delta bamH$ <i>bamG</i> -SW3-α	This study
XLFJ_1131	$\Delta fjoh_1945$ <i>twinstrep-bamA</i> <i>tetR</i> - <i>P_{ompA}</i> <i>P_{ompA}induc</i> - <i>bamG</i> -SW3-α $\Delta bamG$ /pXL184	This study

XLFJ_1139	Δf_{joh_1945} <i>tetR-P_{ompA} P_{ompA}induc-twinstrep-bamA</i> $\Delta bamA$ <i>bamG-SW3-α/pXL184</i>	This study
XLFJ_1140	Δf_{joh_1945} <i>twinstrep-bamA tetR-P_{ompA} P_{fjoh_0824}induc-bamH</i> $\Delta bamH$ <i>bamG-SW3-α</i>	This study
XLFJ_1144	Δf_{joh_1945} <i>twinstrep-bamA tetR-P_{ompA} P_{fjoh_0824}induc-bamH</i> $\Delta bamH$ <i>bamG-SW3-α/pXL184</i>	This study
XLFJ_1162	Δf_{joh_1945} <i>twinstrep-bamA bamG-SW3-α $\Delta bamG2$ (fjoh_1686)</i>	This study
XLFJ_1174	Δf_{joh_1945} <i>HA-bamA bamG-SW3-α</i>	This study
XLFJ_1180	Δf_{joh_1945} <i>twinstrep-bamA tetR-P_{ompA} P_{fjoh_0824}induc -bamH</i> $\Delta bamH$ <i>bamG-SW3-α $\Delta bamH2$ (fjoh_1685)</i>	This study
XLFJ_1183	Δf_{joh_1945} <i>twinstrep-bamA^{Q801K} bamG-SW3-α</i>	This study
XLFJ_1187	Δf_{joh_1945} <i>twinstrep-bamA^{Q801K} bamG-SW3-α $\Delta bamH$</i>	This study
XLFJ_1198	Δf_{joh_1945} <i>twinstrep-bamA^{Q801K} bamG-SW3-α $\Delta bamH$ $\Delta bamH2$</i>	This study
XLFJ_1200	Δf_{joh_1945} <i>twinstrep-bamA $\Delta bamH2$</i>	This study
XLFJ_1201	Δf_{joh_1945} <i>twinstrep-bamA $\Delta bamG2$</i>	This study
XLFJ_1207	Δf_{joh_1945} <i>twinstrep-bamA^{Q801K} bamG-SW3-α $\Delta bamH$ $\Delta bamH2$/pXL184</i>	This study
XLFJ_1208	Δf_{joh_1945} <i>HA-bamA $\Delta bamP$</i>	This study
XLFJ_1211	Δf_{joh_1945} <i>HA-bamA^{Q801K} bamG-SW3-α $\Delta bamH$ $\Delta bamH2$</i>	This study
XLFJ_1213	Δf_{joh_1945} <i>twinstrep-bamA bamG-SW3-α $\Delta bamH2$</i>	This study
XLFJ_1214	Δf_{joh_1945} <i>twinstrep-bamA^{Q801K} bamG-SW3-α $\Delta bamH2$</i>	This study
XLFJ_1215	Δf_{joh_1945} <i>twinstrep-bamA^{Q801K} bamGF-SW3-α $\Delta bamG$ $\Delta bamH2$ $\Delta bamM$</i>	This study
XLFJ_1217	Δf_{joh_1945} <i>twinstrep-bamA^{Q801K} bamG-SW3-α $\Delta bamH$ $\Delta bamH2$ $\Delta fjoh_1769-1771$</i>	This study
XLFJ_1266	Δf_{joh_1945} <i>twinstrep-bamA $\Delta bamP-P3$ $\Delta bamP4$ $\Delta porV$</i>	This study
XLFJ_1271	Δf_{joh_1945} <i>twinstrep-bamA $\Delta bamP-P3$ $\Delta bamP4$ $\Delta porV$ $\Delta plug$</i>	This study
sLO55	Δf_{joh_1945} <i>twinstrep-0403</i>	This study
sLO77	Δf_{joh_1945} <i>HA-bamA bamG-SW3-α twinstrep-fjoh_0403(susC)</i>	This study
sLO78	Δf_{joh_1945} <i>HA-bamA^{Q801K} bamG-SW3-α $\Delta bamH$ $\Delta fjoh_1685$ twinstrep-fjoh_0403(susC)</i>	This study

Supplementary Table 3 | Plasmids used in this study.

plasmid	Descriptions	Reference
pYT313	<i>sacB</i> containing mobilizable suicide vector; Ap ^R (Em ^R)	15
pCP11	<i>E. coli-F. johnsoniae</i> shuttle plasmid; Apr (Emr)	68
pRK2013	Helper plasmid for triparental conjugation; IncP Tra ⁺ Km ^r	36
pET21a(+)	<i>E. coli</i> expression vector, T7 promoter; Ap ^r	Merck
pET15b-TEV	<i>E. coli</i> expression vector T7 promoter; Ap ^r	15
pFL80	pYT313-derived construct used to generate the deletion of <i>porV</i>	15
pFL81	pYT313-derived construct used to generate the deletion of <i>plug</i>	15
pXL155	pYT313-derived construct used to generate the deletion of <i>Fjoh1945</i>	This study
pXL184	pCP11-derived plasmid used to express C-terminally his-tagged SusE under the control of the <i>ompA</i> promoter	This study
pXL200	pYT313-derived construct used to generate N-terminally twinstrep tagged <i>bamA</i>	This study
pXL201	pYT313-derived construct used to generate the deletion of <i>fjoh_1685</i> .	This study
pXL213	pYT313-derived construct used to generate the deletion of <i>bamM</i>	This study
pXL214	pYT313-derived construct used to generate the deletion of <i>bamP</i>	This study
pXL220	pYT313-derived construct used to generate the deletion of <i>fjoh1769-1771</i>	This study
pXL222	pYT313-derived construct used to generate the deletion of <i>fjoh_2401</i>	This study
pXL235	pYT313-derived construct used to generate a strain expressing NanoLuc under the control of the aTC-inducible <i>P_{ompAinduc}</i> promoter	This study
pXL239	pYT313-derived construct used to generate the strain expressing NanoLuc under the aTC-inducible <i>P_{fjoh_0824induc}</i> promoter	This study
pXL243	pYT313-derived construct used to generate the ALFA tagged BamG by insertion after <i>gly245</i>	This study
pXL246	pYT313 derived construct used to generate the deletion of <i>bamA</i>	This study
pXL247	pYT313-derived construct used to generate the strain expressing N-terminal twinstrep tagged BamA under the control of the aTC-inducible <i>P_{ompAinduc}</i> promoter	This study

pXL250	pYT313-derived construct used to generate the strain expressing ALFA-tagged BamG under the aTC-inducible <i>P_{ompA}induc</i> promoter	This study
pXL252	pYT313-derived construct used to generate the deletion of <i>bamG</i>	This study
pXL253	pYT313-derived construct used to generate the deletion of <i>bamH</i>	This study
pXL256	pYT313-derived construct used to generate the strain expressing BamH under the inducible <i>ompA</i> promoter	This study
pXL259	pYT313-derived construct used to generate the strain expressing BamH under the aTC-inducible <i>P_{fjoh_0824}induc</i> promoter	This study
pXL273	pYT313-derived construct used to generate the deletion of <i>fjoh_1686</i>	This study
pXL279	pYT313-derived construct used to generate the <i>bamA</i> ^{Q801K} mutant	This study
pXL283	pYT313-derived construct used to delete <i>bamD</i>	This study
pXL339	pCP11-derived construct to express N-terminal twinstrep-tagged BamP4 under the <i>P_{remA}</i> promoter	This study
pXL340	pCP11-derived construct to express N-terminal twinstrep-tagged BamP under the <i>P_{remA}</i> promoter	This study
pLO79	pET21-derived vector to heterologously overproduce signal peptide-less BamH with a N-terminal 8His tag	This study
pLO80	pET21-derived vector to heterologously overproduce signal peptide-less BamM with a N-terminal 8His tag	This study
pLO92	pET21-derived vector to heterologously overproduce signal peptide-less BamP with a N-terminal 8His tag	This study
pLO95	pET21-derived vector to heterologously overproduce signal peptide-less SusE with a N-terminal 8His tag	This study
pLO100	pET15b-derived vector to heterologously overproduce signal peptide-less SusD with a N-terminal 8His-SUMO tag	This study
pLO102	pET21-derived vector to heterologously overproduce signal peptide-less SusC N-terminal domain with a N-terminal 8His tag	This study
pLO103	pYT313-derived construct used to generate N-terminally twinstrep tagged <i>susC</i>	This study

Supplementary Table 4 | Primers used in this study.

oligos	Sequences (5' to 3')
FL169	GGATATACCGAAAAAATCGC
priXL01	GGATCCTCTAGAGTCGACCT
priXL02	CCCGAATTTTCCGCTGCAT
priXL05	CACCAAGGAAAGTCTACACGA
priXL06	CAGGAAACAGCTATGACCAT
priXL51	GTCTACACGAACCCTTTGG
priXL52	TCCACTTTCATATTACGGTTTA
priXL315	TTAATAAATGTATTCTTCTTTATTAGCC
priXL320	CAAGCTTGCATGCCTGCAGGTCGACTCTAGAGGATCCTGGTTGAAAATGGTGAGAAAAT
priXL316	CGAAATGATGGCTAATAAAGAAGAATACATTTATTAAATTTTAAAGCCCCATTTTAATG
priXL317	TGACCCCGAAGCAGGGTTATGCAGCGGAAAAATTCGGGGATACTTTAACTGAAGGCGAA
priXL325	TTGTTGGACACAGAATTCCT
priXL326	GAATCGCTCTTACTTATATAGAGT
priXL364	CAGATTTCTACAACAGTTACATTTGATGCTGACGCAATCCATCACCATCATCACCACCA
priXL366	GAACGCAGCTATTTGTTTTATATATTTTTTCATACTTAATTTTTTTAATTACAATTTAG
priXL367	ATGAAAAAATATATAAAACAAATAGCTG
priXL368	GATTGCGTCAGCATCAAATGT
priXL415	CGCCGAACCTCCCGATCCACCTCCGGAACCTCCACCTTTTTTCGAACTGCGGGT GGCTCCATTGAGCTTTTATTTGTGAAAACTAC
priXL416	GGTGGAGGTTCCGGAGGTGGATCGGGAGGTTTCGGCGTGGTCACATCCACAATTTGAGAA GGATAGAGTTCCTTTTGATCAAGG
priXL417	ATAATGACCCCGAAGCAGGGTTATGCAGCGGAAAAATTCGGGGATATTTCG ATATCAACAGTTCCAG
priXL418	CAAGCTTGCATGCCTGCAGGTCGACTCTAGAGGATCCACTTCCAGATAACCAGTATCAA
priXL419	TATTTGCCAAAAAAATTGATTCCTTACCAGGAATATCTAAATCAG

priXL420 GATTTAGATATTCCTGGTAAGGAATCAATTTTTTTGGCAAATATAAAAGG
 priXL421 ACCCCGAAGCAGGGTTATGCAGCGGAAAAATTCGGGGTTTGTATTTGATCCCTATTCCT
 priXL422 AAGCTTGCATGCCTGCAGGTCGACTCTAGAGGATCCGCTCAAACTTTTTAAGTTTGAGC
 priXL423 GTTTTTTTTAGCTGCTTCATTTTTGGTTTGTAACGAAAATTCG
 priXL424 CGAATTTTCGTTTTACAAACCAAAAATGAAGCAGCTAAAAAAAAC
 priXL425 TGACCCCGAAGCAGGGTTATGCAGCGGAAAAATTCGGGTGGATCAGATTATCTTGCTCT
 priXL426 CAAGCTTGCATGCCTGCAGGTCGACTCTAGAGGATCCTAGTGGTTACGTCTGAAAAATG
 priXL429 TGACCCCGAAGCAGGGTTATGCAGCGGAAAAATTCGGGATTCTGGAGCTAAACAGGAA
 priXL446 CGAACAAGTGGAGAACATAGAA
 priXL447 ATAAATAATGCGGGCATCACG
 priXL448 ATTAGCTACAATCAAGGCTAAAA
 priXL457 CAAGCTTGCATGCCTGCAGGTCGACTCTAGAGGATCCGGTTATTAACTGAGTTGGATT
 priXL460 TGACCCCGAAGCAGGGTTATGCAGCGGAAAAATTCGGGTCAACAGGAATACGTGTAAAC
 priXL461 CCAAGCTTGCATGCCTGCAGGTCGACTCTAGAGGATCCCCGTTTTTCATCAAAAACAACC
 priXL462 GTTTTTTTTATTCTATTTATTTTCGCTCCTATTGTTAATTTTTTAGGTGCGC
 priXL463 TGCGCACCTAAAAATTAACAATAGGAGCGAAATAAATAGAATAAAAAAAAC
 priXL464 TGACCCCGAAGCAGGGTTATGCAGCGGAAAAATTCGGGAAGATACTCGTTCTGGTTTTG
 priXL465 CAAGCTTGCATGCCTGCAGGTCGACTCTAGAGGATCCCAATATTAAACCGCGCTCTA
 priXL466 AAAATGAAAAATAAACTAGGATGTTCAAACGATCCAGAATCA
 priXL467 GATTCTGGATCGTTTGAACATCCTAGTTTATTTTTTCATTTTCGAG
 priXL468 CCCCGAAGCAGGGTTATGCAGCGGAAAAATTCGGGGATGATGATGCTTTTCATAAATCT
 priXL469 TTGTTATAGCATCGCCAAATG
 priXL470 TCATCGTATAACATAACGCCG
 priXL471 TGGTCTTGTAATAACGAACG
 priXL472 CCAGCTGGTATCAAATTCAAT
 priXL473 ATGCGTGATGTAATTTGAATC
 priXL474 TTATATTGTGTGGATGATGCC
 priXL475 CATCCAAAAACAGTGTCAACA

priXL476	ATGAGATTGACGGTTTTATCG
priXL484	ATTTATTCATTTTGACAAAGAGTTGTTCAAACGATCCAGAATCA
priXL485	TGATTCTGGATCGTTTGAACAACTCTTTGTCAAATGAATAAATTAGAA
priXL486	CCCCGAAGCAGGGTTATGCAGCGGAAAAATTCGGGAGTTCAACACTTAATAGGCTTA
priXL489	CCAAGCTTGCATGCCTGCAGGTCGACTCTAGAGGATCCATTGATATTGGATGTGCTGGT
priXL490	TGCTTTAAATCAGGATATGGTACTAAAAAGGAATTAAACTCTACT
priXL491	AGAGTTTTAATTCCTTTTTAGTACCATATCCTGATTTAAAGCACT
priXL492	ACCCCGAAGCAGGGTTATGCAGCGGAAAAATTCGGGCGTAAATTTCTTCTATCGAGAG
priXL493	TGTGTCTCTCTTGAAATTACTA
priXL494	AGTTTCCTTAGATGCTGAAAAC
priXL495	AATTTATCGTCTATACTGCTTTT
priXL496	CAAGCTTGCATGCCTGCAGGTCGACTCTAGAGGATCCGCAGGAGTTACTAACATCATCA
priXL497	TAGGGATACAAGCAAAAGTAACACCAAATTTTTTAAATACAAAATCAAATCCCTATCAGTGAT AGAGAAAAAACCTACAAAAAACATGCGTTGTATAACGCATTAC
priXL498	ATTTAAAAAATTTGGTGTTACTTTTGCTTGTATCCCTATCAGTGATAGAGAATTAATAAATTG TAATTAATAAATAAGATGATTAAAAAATTATAATAAGTGCT
priXL499	TCTGTTAATCTACGTCTTAATTCCTCTTCTAATCTAGAGTTGAATTTGCTCTTCACAAA
priXL500	ATTAGAAGAGGAATTAAGACGTAGATTAACAGAATAATCAATGTTCTGATGGTGTTAAC
priXL501	GACCCCGAAGCAGGGTTATGCAGCGGAAAAATTCGGGAAC TTGAAGCAGAATTTGAAG
priXL504	ATAGGGAACGTCGCAAAATTACAAAATTTTATGCAGTTTATACTAATATATTATTCCCTATCA GTGATAGAGACTAAATTTTAATATGCGTTGTATAACGCATTAC
priXL506	AAATTTTTTAAATACAAAATCAAATGTAAAAAAACCTACAAAAAACATAATACAACCAATG CGTTTGACGG
priXL507	TTAGAAAAACAAC TTAAATGTGAAAGTGGGTCTTAATTGTAGTTGTGAGTTTCAAATAC
priXL508	TTAAGACCCACTTTCACATTTAAG
priXL509	TTTTTTTAACATTTGATTTTGATTTAAAAAATTTGGTGTTACTTTTGCTTGTAAATTAATAAAT TGTAATTAATAAATAAGTATGTCTAGATTAGATAAAAGTAAAGTGATT
priXL510	CTTGGGATAGGTTTTCTTCAAATCTGCTTCAAGTTCCCGAATTTTTCCGCTGCAT

priXL511	TCGTTATTTAATACATTGATGATGTTAGTAACTCCTGCGGATCCTCTAGAGTCGACCT
priXL512	GCAGGAGTTACTAACATCATCAA
priXL513	AACTTGAAGCAGAATTTGAAGG
priXL515	CATCTTAATTTTTTTAATTACAATTTAGTTAATTCTCTATCA
priXL522	AAATACTCGAAGAACGAGAAG
priXL523	AATTAATACACGTTTGTGTGTTG
priXL536	TCAATGTTCTGATGGTGTTAACTG
priXL537	CATAATAGTATTTTACTTAATTTTTGGTAATAAAATTCTC
priXL538	AGAATTAATACTAAATTGTAATTAATAAAAAATTAAGATGGTCTTCACACTCGAAGATTTC
priXL539	TTTTATTACCAAAAATTAAGTAAAATACTATTATGGTCTTCACACTCGAAGATTTC
priXL540	CTTCAGTGCAGTTAACACCATCAGAACATTGATTACGCCAGAATGCGTTTCGC
priXL543	GATAAATGGTTTGTGAAGAGCA
priXL544	GAACGATATAAGCAAACAAGCA
priXL545	ATGATTAAAAAAATTATAATAAGTGCTTGTTT
priXL546	TTAGTTGAATTTGCTCTTCACA
priXL551	TCTAGATTAGAAGAGGAATTAAGACGTAGATTAACAGAAGATCCGGACCCTTATGCATA
priXL552	CTGTTAATCTACGTCTTAATTCCTCTTCTAATCTAGAGCCGCTTACATTAATTTCTCG
priXL557	AGAATTAATACTAAATTGTAATTAATAAAAAATTAAGATGTTACAAAAAGAATACCACAAAT
priXL558	TCTTCAGTGCAGTTAACACCATCAGAACATTGACTAAAATTGTTGTCCTATGATAAAGT
priXL560	TAATAAATTGTAATTAATAAAAAATTAAGATGTACAATACTTCTTTTATTAAGAAAATTC
priXL561	TTCTTCAGTGCAGTTAACACCATCAGAACATTGATTAATTTGGTTTCGTGTAGTAAACC
priXL562	ATTACCAAAAATTAAGTAAAATACTATTATGTACAATACTTCTTTTATTAAGAAAATTC
priXL563	CAAGCTTGCATGCCTGCAGGTCGACTCTAGAGGATCCCTTTTCTCGTTCCAACATACG
priXL564	TTTGCTTTATTAGTAGTAGAGGTACAGATTATTTGTGGTATTCT
priXL565	ACAAATAATCTGTACCTCTACTACTAATAAAGCAAATGGC
priXL566	AAGCAGGGTTATGCAGCGGAAAAATTCGGGAACGCCTATAGGATTATTGTTTG
priXL567	GTGCAGTTAACACCATCAGAACATTGATTAGTTGAATTTGCTCTTCACA
priXL568	CTTGTTTGCTTATATCGTTCTGAAGATGTAGGGATGACTTTAG

priXL569	CTAAAGTCATCCCTACATCTTCGAACGATATAAGCAAACAAG
priXL570	ACAACCAATCCTAAGTATTGTACATATTAAATAATCAAAATT
priXL571	ATTATTTAATATGTACAATACTTAGGATTGGTTGTTACAGAAAG
priXL580	GAAAAGGTATAGACTGGCCAG
priXL581	AAGCAAATCCTAATGTTTGTTTG
priXL634	ATGCCTGCAGGTCGACTCTAGAGGATCCTTAGCTTTAGTTGACACTTATAC
priXL635	ACTTCAGTGATATCCATAGCTTAGAATTTTATTGTTAAGT
priXL636	TAAAATTCTAAGCTATGGATATCACTGAAGTTCCTAAAC
priXL637	AGCAGGGTTATGCAGCGGAAAAATTCGGGCTTTCTTCGAATTAGATTGCG
priXL644	ATTTATATTTTTAGCCTTGATTGTAG
priXL645	GGAAATTACTTATTCTATGTTCTCC
priXL646	GTTCTAGATACGGAAAGCAGATTGGAGCAA
priXL647	TTGCTCCAATCTGCTTTCCGTATCTAGAACT
priXL648	CAAATCCAGCAGTATTAAAATC
priXL649	CGCTTTTTGATAGACTAAATCC
priXL650	TACCCATACGATGTTCCAGATTACGCTGATAGAGTTCCTTTTGATCAAGG
priXL651	AGCGTAATCTGGAACATCGTATGGGTATTGAGCTTTTATTTGTGAAAACTAC
priXL656	GCATGCCTGCAGGTCGACTCTAGAGGATCCGTATCTTGTTGTTATGGGAAC
priXL657	TTAGCATAAGCTGTAAGGGCAGCAACAATTAATAG
priXL658	TTGTTGCTGCCCTTACAGCTTATGCTAATTTGATGAAA
priXL659	GAAGCAGGGTTATGCAGCGGAAAAATTCGGGGCAATTTACTCTCTAAATCAGC
priXL747	ATGTGACCACGCCGAACCTCC GGTGGATCGGGAGGTTTCGGCGTGGTCACATCCACAATTTGAGAAGGATGTTGACTCATCT
priXL748	ACCCCG
priXL749	AATTGGAGGTTTCTATTGCTGAATCCCGGTTAATTCCTTTTTAGTACTTTATATTGTT GGTGGATCGGGAGGTTTCGGCGTGGTCACATCCACAATTTGAGAAGAACGGTACAAGAAA
priXL750	GTCGCTG
priXL751	AATTGGAGGTTTCTATTGCTGAATCCCGGTTATTGAGCGGCATTCACTTTTTT

oLO130	TCTGGCGGTGGATCGGATAAAGATTTTAATGCGATTGGCG
oLO131	AGCCGGATCTCATCATTAAATTTGGTTTCGTGTAGTAAACCT
oLO132	CGATCCACCGCCAGA
oLO133	TGATGAGATCCGGCTGCTAA
oLO134	TCTGGCGGTGGATCGAATAAAAAGGATGATGATGAAGAGATTG
oLO135	AGCCGGATCTCATCATTAAATCTTTTTATAAGGATATGTATTATCTAAATGAATTC
oLO178	TCTGGCGGTGGATCGCAAAACGGTACAAGAAAGTCG
oLO179	AGCCGGATCTCATCATTATTGAGCGGCATTCACTT
oLO180	TCTGGCGGTGGATCGCAAGAAAGAGCTGTTTCTGGA
oLO184	TCTGGCGGTGGATCGGATTCAGCAGATGACAATGTAAATTT
oLO185	AGCCGGATCTCATCATTAGATTGCGTCAGCATCAAA
oLO186	CCTCTCCCCGCGCGAGAAAAGCAAACACTTTTGATGG
oLO187	GTGGCTCCAAGCGCTCGCAAAAGAAAGTTGCGC
oLO188	CAACTTTCTTTTGCGAGCGCTTGGAGCCAC
oLO189	AACAGCTCTTTCTTGACTAGTTTTCTCGAACTGCG
oLO190	TTGAGAAAACTAGTCAAGAAAGAGCTGTTTCTGGA
oLO191	CGCCGTTGGATACACCAAGGTGAAACTTTTGCTGTTGCAGA
oLO205	AGCCGGATCTCATCATTATCCAGCTAATTTTACGTAACTGT
oLO207	TCCACCAATCTGTTCTCTGT
oLO208	GGCTGCTAACAAAGCCC
oLO209	GGGCTTTGTTAGCAGCCTTAGAATTTATCCCAGAAAAGTTTAGTAGT
oLO210	GAACAGATTGGTGGATCTGATGATTTTGGGAATATGAACC

Supplementary references

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