

Figure S1: Protein sequences of the inteins used in this study. Sequence alignment of *NpuDnaE*, *NpuDnaB^{Δ283}*, *PhoRadA*, and *TvoVMA*, inteins. The sequences were aligned using ClustalW (Thompson 1994) and manually adjusted based on pairwise structural alignments with DALI server (Hasegawa 2009). β -strands and α -helices are presented above the sequences by filled arrows and squiggles, respectively. Functional split sites are indicated by filled triangles and non-functional split sites by open triangles. The native split site of *NpuDnaE* intein is marked with an asterisk and the endonuclease domain insertion site in *NpuDnaB^{Δ283}* intein is denoted with a diamond in grey. The boundaries between intein and exteins are indicated by slashes.

(a) *NpuDnaB* intein



(b) *TvoVMA* intein

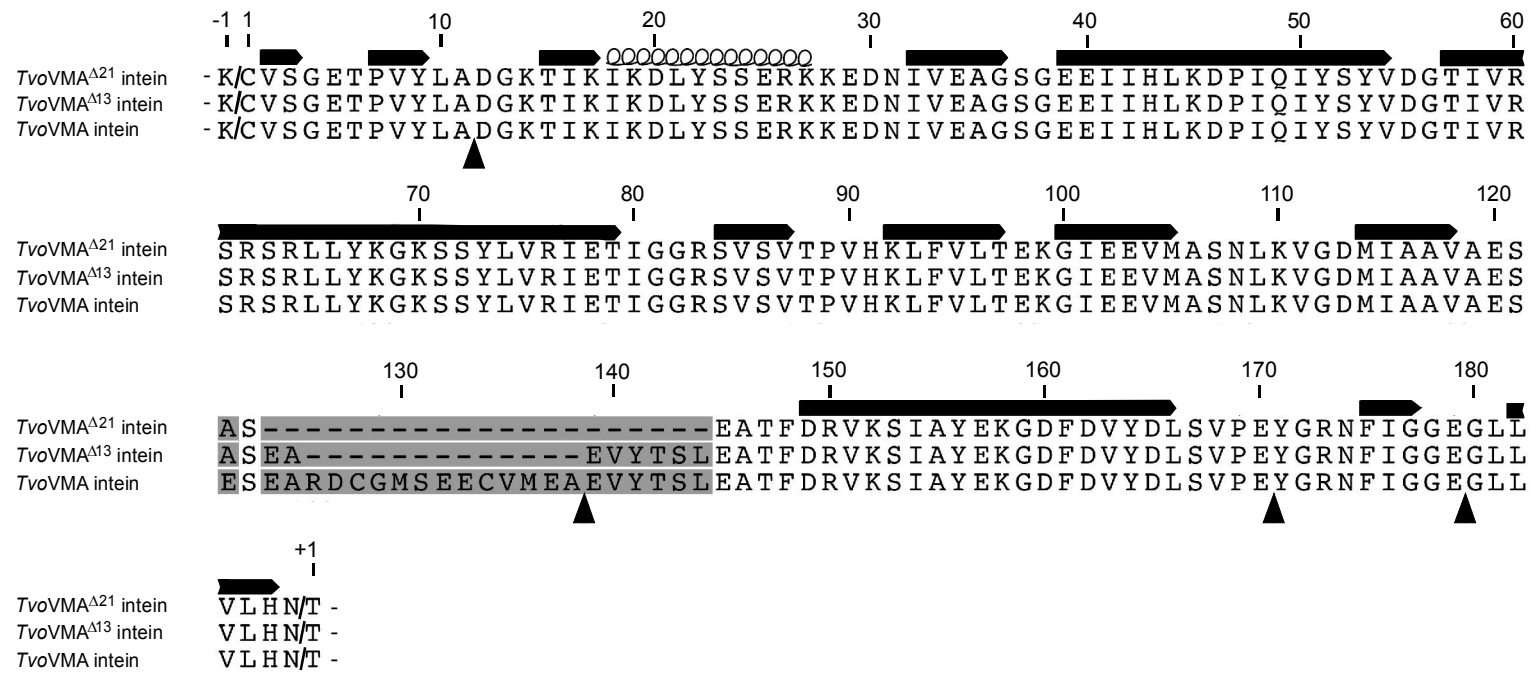


Figure S2: Sequences of the inteins used for structural studies. (a) Sequence alignment of *NpuDnaB*^{Δ283} and *NpuDnaB*^{Δ290} inteins. (b) Sequence alignment of *TvoVMA*, *TvoVMA*^{Δ13}, and *TvoVMA*^{Δ21} inteins. Split sites in *NpuDnaB*^{Δ290} and *TvoVMA* inteins are indicated with triangles below the sequence alignment. Functional split sites are indicated by filled triangles and non-functional split sites by open triangles. Endonuclease domain insertion site in the minimized *NpuDnaB* inteins is shown by a diamond in grey. Secondary structures are indicated above the alignments by filled arrows (β -strands) and squiggles (α -helices). Functional split sites are indicated by filled triangles and non-functional split sites by open triangles. The boundaries between intein and exteins are indicated by slashes.

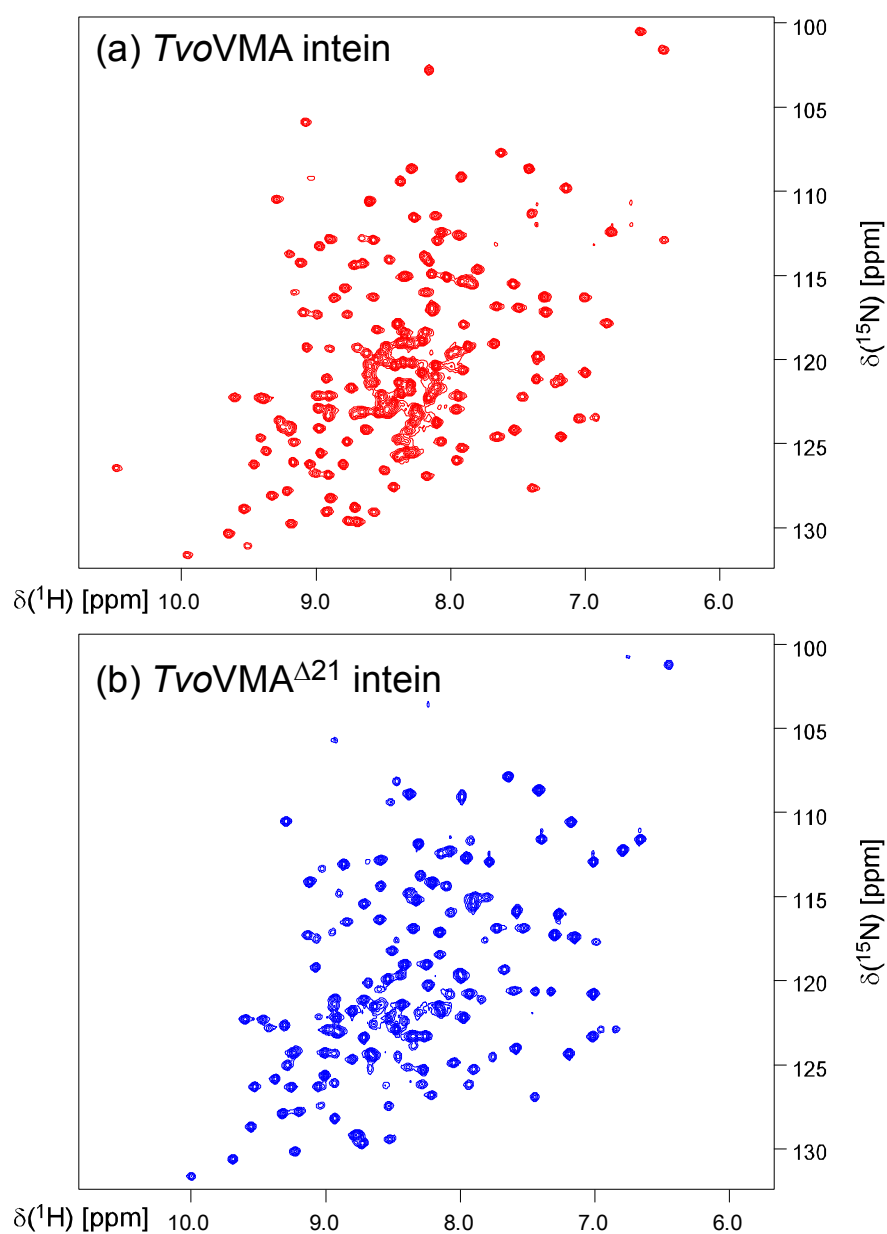
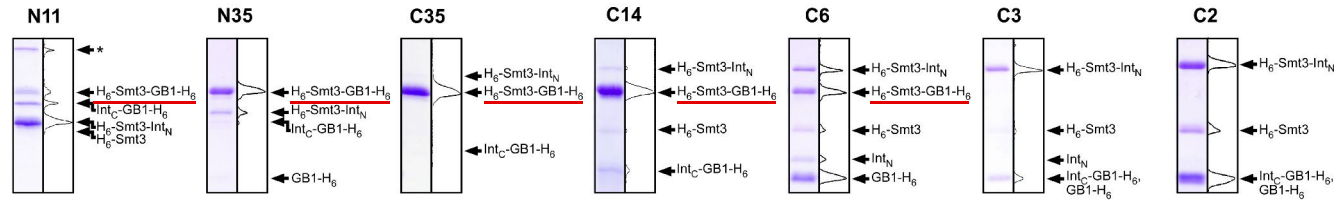


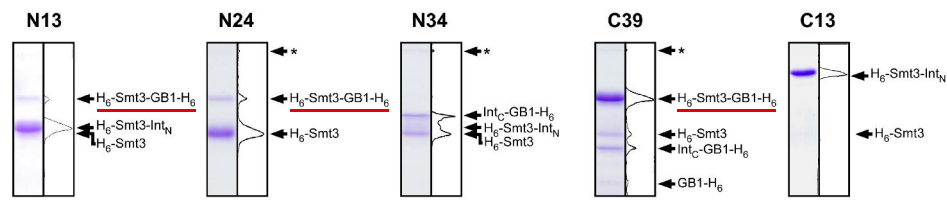
Figure S3: (a) [^1H , ^{15}N]-TROSY-HSQC spectrum of 0.4 mM *TvoVMA* intein, 10 mM sodium phosphate, pH 6 recorded at a ^1H frequency of 600 MHz at 307 K. (b) [^1H , ^{15}N]-HSQC spectrum of 0.5 mM *TvoVMA* Δ^{21} intein, 20 mM sodium phosphate, pH 7 recorded at a ^1H frequency of 800 MHz at 298 K.

Supplementary Figure 3

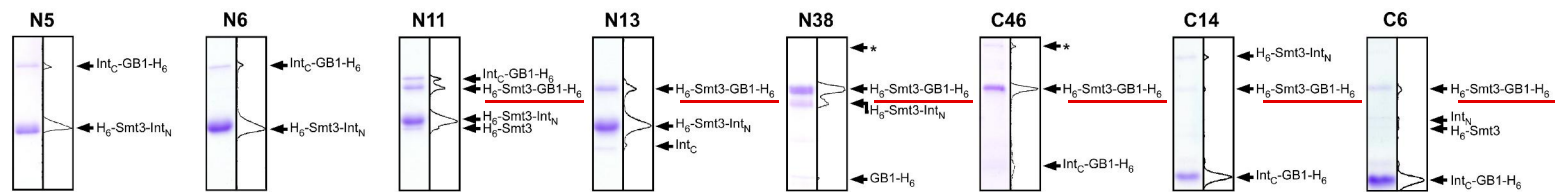
(a) *NpuDnaE* intein



(b) *NpuDnaB*^{Δ283} intein



(c) *PhoRadA* intein



(d) *TvoVMA* intein

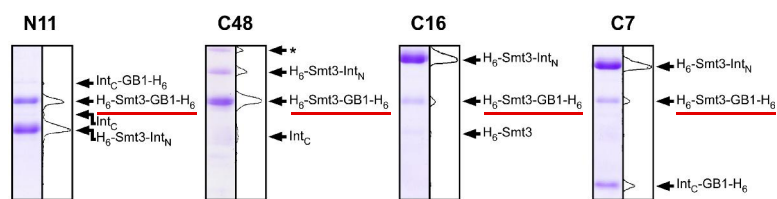


Figure S4: Analysis of *in vivo* PTS by new split inteins by SDS-PAGE. (a) PTS of new split inteins derived from *NpuDnaE* intein and of the previously described split *NpuDnaE*_{C35}, *NpuDnaE*_{C14} and *NpuDnaE*_{C6} inteins. (b) PTS of new split inteins derived from *NpuDnaB*^{Δ283} intein. (c) PTS of new split inteins derived from *PhoRadA* intein. (d) PTS of new split inteins derived from *TvoVMA* intein. Image analysis of SDS-PAGE gels of the elution fractions from *in vivo* dual-expression of the two precursors. Intensities analysed by ImageJ (NIH) are plotted for each pair of split intein precursors. Split sites are indicated above the lanes.

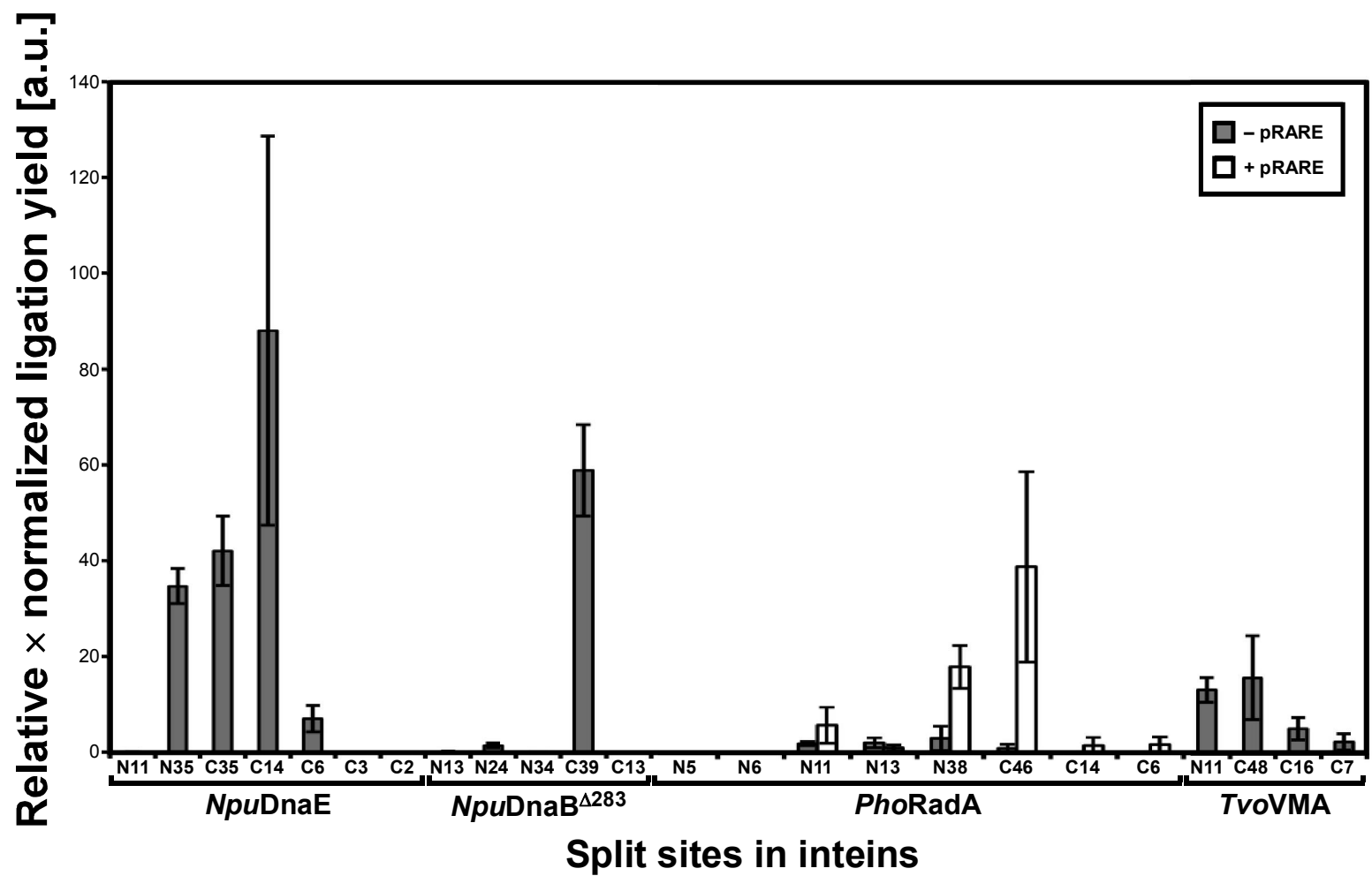


Figure S5: Relative ligation yield multiplied by the normalized ligation yield. Inteins and split sites are indicated below the chart. Data presents mean values \pm s.d. (n=3).

Block A split inteins

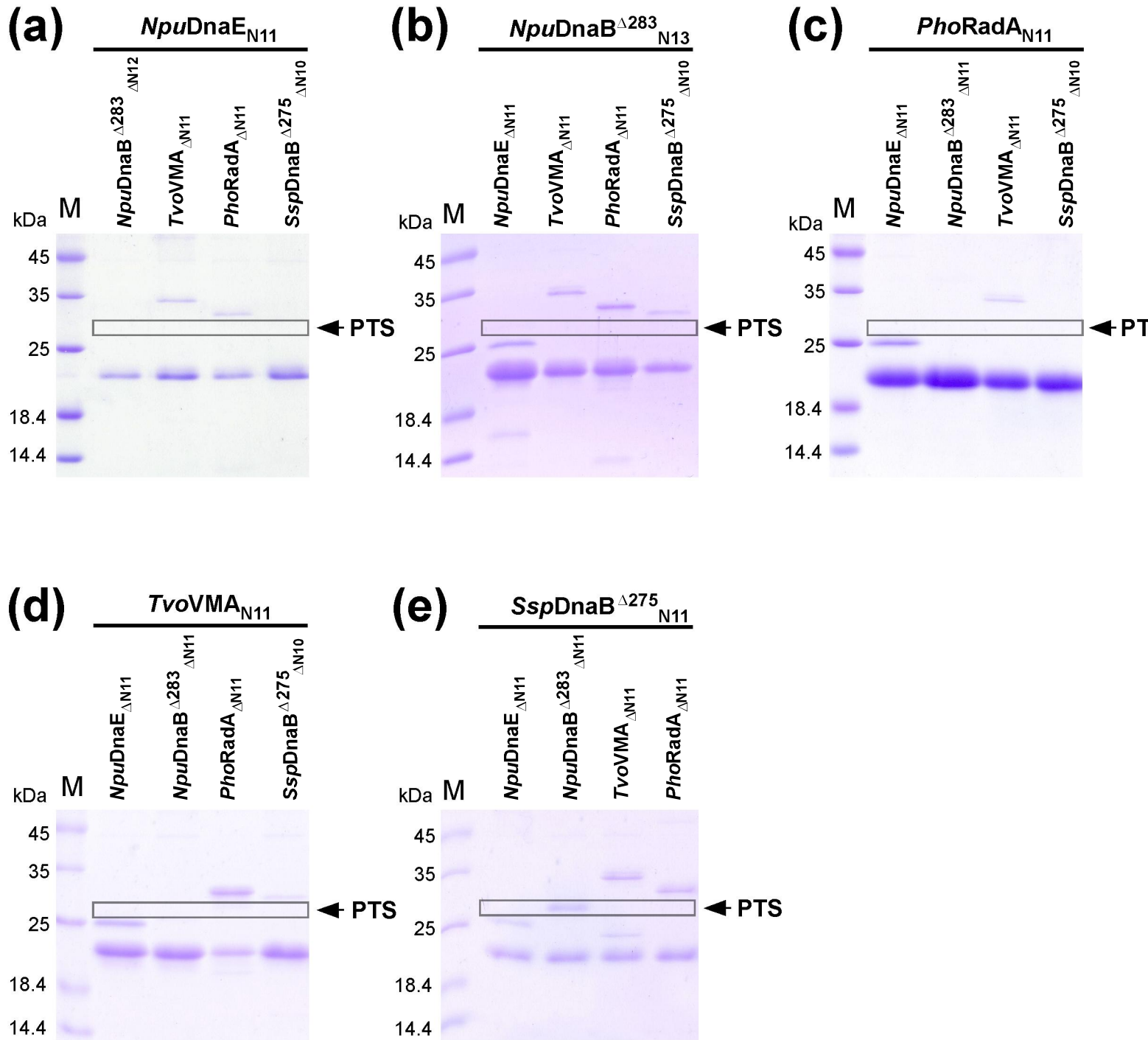
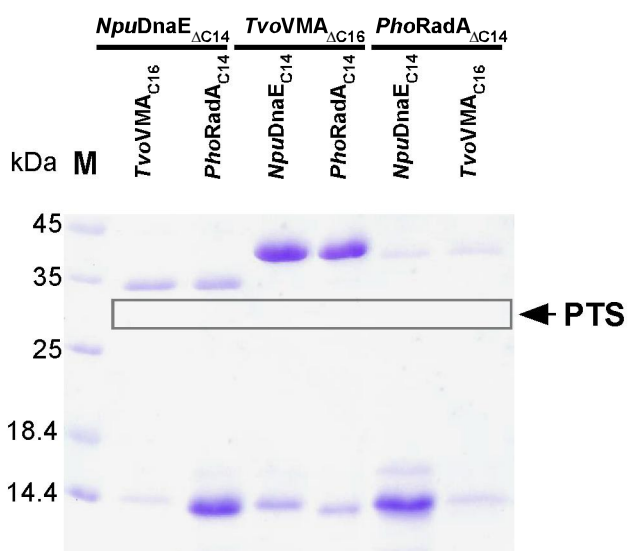


Figure S6: SDS-PAGE analysis of in vivo cross-reactivity among split inteins with split sites near the N terminus. Combinations of the split inteins within the block A are tested. Different pairs are indicated above the lanes. The expected bands by PTS due to cross-activity between different split inteins are highlighted by rectangles. M stands for molecular weight markers.

(a) Block F



(b) Block G

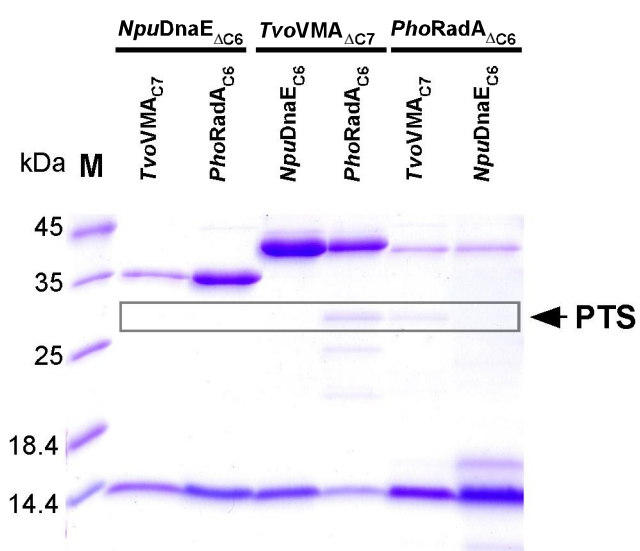


Figure S7: SDS-PAGE analysis of *in vivo* cross-reactivities of different split inteins near the C-terminus. (a) Combinations of different split inteins at the loop within the block F (b) combinations of the split inteins split within the block G. different pairs are indicated above the lanes. The expected bands by PTS due to cross-activity between different split inteins are highlighted by rectangles. M stands for molecular weight markers.

Table S1: Summary of plasmids used in this study

Construct	Plasmid name	Addgene ID	Ref
H ₆ -Smt3- <i>Npu</i> DnaE _{ΔC35}	pSARSF53-1	-	#
H ₆ -Smt3- <i>Npu</i> DnaE _{ΔC14}	pHYRSF53-36	-	(Aranko et al. 2009)
H ₆ -Smt3- <i>Npu</i> DnaE _{ΔC6}	pSARSF53-93	-	#
H ₆ -Smt3- <i>Npu</i> DnaE _{ΔC3}	pSARSF53-HY171	-	#
H ₆ -Smt3- <i>Npu</i> DnaE _{ΔC2}	pSARSF53-HY172	-	#
H ₆ -Smt3- <i>Npu</i> DnaE _{N35}	pSARSF53-218	-	#
H ₆ -Smt3- <i>Npu</i> DnaE _{N11}	pSARSF53-756	-	#
H ₆ -Smt3- <i>Npu</i> DnaB ^{Δ283} _{ΔC39}	pSARSF53-259	-	#
H ₆ -Smt3- <i>Npu</i> DnaB ^{Δ283} _{ΔC13}	pSARSF53-115	-	#
H ₆ -Smt3- <i>Npu</i> DnaB ^{Δ283} _{N34}	pSARSF53-254	-	#
H ₆ -Smt3- <i>Npu</i> DnaB ^{Δ283} _{N24}	pSARSF53-253	-	#
H ₆ -Smt3- <i>Npu</i> DnaB ^{Δ283} _{N13}	pSARSF53-HY100	-	#
H ₆ -Smt3- <i>Tvo</i> VMA _{ΔC48}	pSARSF53-343	-	#
H ₆ -Smt3- <i>Tvo</i> VMA _{ΔC16}	pSARSF53-143	-	#
H ₆ -Smt3- <i>Tvo</i> VMA _{ΔC7}	pSARSF53-HY176	-	#
H ₆ -Smt3- <i>Tvo</i> VMA _{N11}	pSARSF53-110	-	#
H ₆ -Smt3- <i>Pho</i> RadA _{ΔC46}	pSARSF53-344	-	#
H ₆ -Smt3- <i>Pho</i> RadA _{ΔC14}	pSARSF53-166	-	#
H ₆ -Smt3- <i>Pho</i> RadA _{ΔC6}	pSARSF53-165	-	#
H ₆ -Smt3- <i>Pho</i> RadA _{N38}	pSARSF53-459	-	#
H ₆ -Smt3- <i>Pho</i> RadA _{N13}	pSARSF53-455	-	#
H ₆ -Smt3- <i>Pho</i> RadA _{N11}	pSARSF53-168	-	#
H ₆ -Smt3- <i>Pho</i> RadA _{N6}	pSARSF53-176	-	#
H ₆ -Smt3- <i>Pho</i> RadA _{N5}	pSARSF53-175	-	#
<i>Npu</i> DnaE _{C35} -GB1-H ₆	pMHBAD14C	42304	(Buchinger et al 2010)
<i>Npu</i> DnaE _{C14} -GB1-H ₆	pMKBAD28	45595	(Aranko et al 2013)
<i>Npu</i> DnaE _{C6} -GB1-H ₆	pHYBAD94	42305	(Oeemig et al 2009)
<i>Npu</i> DnaE _{C3} -GB1-H ₆	pSABAD148	-	#
<i>Npu</i> DnaE _{C2} -GB1-H ₆	pSABAD147	-	#
<i>Npu</i> DnaE _{ΔN35} -GB1-H ₆	pSABAD219	45596	(Aranko et al 2013)
<i>Npu</i> DnaE _{ΔN11} -GB1-H ₆	pSABAD14-HY43	-	#
<i>Npu</i> DnaB ^{Δ283} _{C39} -GB1-H ₆	pSABAD250	45612	(Aranko et al 2013)
<i>Npu</i> DnaB ^{Δ283} _{C13} -GB1-H ₆	pSABAD14-116	-	#
<i>Npu</i> DnaB ^{Δ283} _{ΔN34} -GB1-H ₆	pSABAD252	-	#
<i>Npu</i> DnaB ^{Δ283} _{ΔN24} -GB1-H ₆	pSABAD251	-	#
<i>Npu</i> DnaB ^{Δ283} _{ΔN12} -GB1-H ₆	pSABAD14-111	-	#
<i>Tvo</i> VMA _{C48} -GB1-H ₆	pSABAD331	45609	(Aranko et al 2013)
<i>Tvo</i> VMA _{C16} -GB1-H ₆	pSABAD14-142	-	#
<i>Tvo</i> VMA _{C7} -GB1-H ₆	pHYBAD177	-	#
<i>Tvo</i> VMA _{ΔN11} -GB1-H ₆	pSABAD14-98	-	#
<i>Pho</i> RadA _{C46} -GB1-H ₆	pSABAD332	45610	(Aranko et al 2013)
<i>Pho</i> RadA _{C14} -GB1-H ₆	pSABAD14-167	-	#
<i>Pho</i> RadA _{C6} -GB1-H ₆	pSABAD14-172	-	#
<i>Pho</i> RadA _{ΔN38} -GB1-H ₆	pSABAD14-467	-	#
<i>Pho</i> RadA _{ΔN13} -GB1-H ₆	pSABAD14-466	-	#
<i>Pho</i> RadA _{ΔN11} -GB1-H ₆	pSABAD14-371	-	#
<i>Pho</i> RadA _{ΔN6} -GB1-H ₆	pSABAD14-738	-	#
<i>Pho</i> RadA _{ΔN38} -GB1-H ₆	pSABAD14-467	-	#
<i>Pho</i> RadA _{ΔN13} -GB1-H ₆	pSABAD14-466	-	#
<i>Pho</i> RadA _{ΔN11} -GB1-H ₆	pSABAD14-371	-	#
<i>Pho</i> RadA _{ΔN6} -GB1-H ₆	pSABAD14-738	-	#
<i>Pho</i> RadA _{ΔN5} -GB1-H ₆	pSABAD14-737	-	#
H ₆ -Smt3- <i>Ssp</i> DnaB ^{Δ275} _{N11}	pSARSF53-HY41	-	#
<i>Ssp</i> DnaB ^{Δ275} _{ΔN10} -GB1-H ₆	pSABAD14-HY42	-	#
H ₆ -GB1- <i>Tvo</i> VMA _{N11}	pSADuet110	-	#
H ₆ -GB1- <i>Pho</i> RadA _{ΔC6}	pSADuet165	-	#
H ₆ -Smt3-A- <i>Npu</i> DnaB ^{Δ290} -A	pCARSF02	-	#
H ₆ -Smt3-A- <i>Tvo</i> VMA-A	pHYRSF175	-	#
H ₆ -Smt3-A- <i>Tvo</i> VMA ^{Δ21} -A	pJORSF73	-	#

#described here

Table S1: Summary of plasmids used in this study

Construct	Plasmid name	Addgene ID	Ref
H ₆ -Smt3- <i>Npu</i> DnaE _{ΔC35}	pSARSF53-1	-	#
H ₆ -Smt3- <i>Npu</i> DnaE _{ΔC14}	pHYRSF53-36	-	(Aranko et al. 2009)
H ₆ -Smt3- <i>Npu</i> DnaE _{ΔC6}	pSARSF53-93	-	#
H ₆ -Smt3- <i>Npu</i> DnaE _{ΔC3}	pSARSF53-HY171	-	#
H ₆ -Smt3- <i>Npu</i> DnaE _{ΔC2}	pSARSF53-HY172	-	#
H ₆ -Smt3- <i>Npu</i> DnaE _{N35}	pSARSF53-218	-	#
H ₆ -Smt3- <i>Npu</i> DnaE _{N11}	pSARSF53-756	-	#
H ₆ -Smt3- <i>Npu</i> DnaB ^{Δ283} _{ΔC39}	pSARSF53-259	-	#
H ₆ -Smt3- <i>Npu</i> DnaB ^{Δ283} _{ΔC13}	pSARSF53-115	-	#
H ₆ -Smt3- <i>Npu</i> DnaB ^{Δ283} _{N34}	pSARSF53-254	-	#
H ₆ -Smt3- <i>Npu</i> DnaB ^{Δ283} _{N24}	pSARSF53-253	-	#
H ₆ -Smt3- <i>Npu</i> DnaB ^{Δ283} _{N13}	pSARSF53-HY100	-	#
H ₆ -Smt3- <i>Tvo</i> VMA _{ΔC48}	pSARSF53-343	-	#
H ₆ -Smt3- <i>Tvo</i> VMA _{ΔC16}	pSARSF53-143	-	#
H ₆ -Smt3- <i>Tvo</i> VMA _{ΔC7}	pSARSF53-HY176	-	#
H ₆ -Smt3- <i>Tvo</i> VMA _{N11}	pSARSF53-110	-	#
H ₆ -Smt3- <i>Pho</i> RadA _{ΔC46}	pSARSF53-344	-	#
H ₆ -Smt3- <i>Pho</i> RadA _{ΔC14}	pSARSF53-166	-	#
H ₆ -Smt3- <i>Pho</i> RadA _{ΔC6}	pSARSF53-165	-	#
H ₆ -Smt3- <i>Pho</i> RadA _{N38}	pSARSF53-459	-	#
H ₆ -Smt3- <i>Pho</i> RadA _{N13}	pSARSF53-455	-	#
H ₆ -Smt3- <i>Pho</i> RadA _{N11}	pSARSF53-168	-	#
H ₆ -Smt3- <i>Pho</i> RadA _{N6}	pSARSF53-176	-	#
H ₆ -Smt3- <i>Pho</i> RadA _{N5}	pSARSF53-175	-	#
<i>Npu</i> DnaE _{C35} -GB1-H ₆	pMHBAD14C	42304	(Buchinger et al 2010)
<i>Npu</i> DnaE _{C14} -GB1-H ₆	pMKBAD28	45595	(Aranko et al 2013)
<i>Npu</i> DnaE _{C6} -GB1-H ₆	pHYBAD94	42305	(Oeemig et al 2009)
<i>Npu</i> DnaE _{C3} -GB1-H ₆	pSABAD148	-	#
<i>Npu</i> DnaE _{C2} -GB1-H ₆	pSABAD147	-	#
<i>Npu</i> DnaE _{ΔN35} -GB1-H ₆	pSABAD219	45596	(Aranko et al 2013)
<i>Npu</i> DnaE _{ΔN11} -GB1-H ₆	pSABAD14-HY43	-	#
<i>Npu</i> DnaB ^{Δ283} _{C39} -GB1-H ₆	pSABAD250	45612	(Aranko et al 2013)
<i>Npu</i> DnaB ^{Δ283} _{C13} -GB1-H ₆	pSABAD14-116	-	#
<i>Npu</i> DnaB ^{Δ283} _{ΔN34} -GB1-H ₆	pSABAD252	-	#
<i>Npu</i> DnaB ^{Δ283} _{ΔN24} -GB1-H ₆	pSABAD251	-	#
<i>Npu</i> DnaB ^{Δ283} _{ΔN12} -GB1-H ₆	pSABAD14-111	-	#
<i>Tvo</i> VMA _{C48} -GB1-H ₆	pSABAD331	45609	(Aranko et al 2013)
<i>Tvo</i> VMA _{C16} -GB1-H ₆	pSABAD14-142	-	#
<i>Tvo</i> VMA _{C7} -GB1-H ₆	pHYBAD177	-	#
<i>Tvo</i> VMA _{ΔN11} -GB1-H ₆	pSABAD14-98	-	#
<i>Pho</i> RadA _{C46} -GB1-H ₆	pSABAD332	45610	(Aranko et al 2013)
<i>Pho</i> RadA _{C14} -GB1-H ₆	pSABAD14-167	-	#
<i>Pho</i> RadA _{C6} -GB1-H ₆	pSABAD14-172	-	#
<i>Pho</i> RadA _{ΔN38} -GB1-H ₆	pSABAD14-467	-	#
<i>Pho</i> RadA _{ΔN13} -GB1-H ₆	pSABAD14-466	-	#
<i>Pho</i> RadA _{ΔN11} -GB1-H ₆	pSABAD14-371	-	#
<i>Pho</i> RadA _{ΔN6} -GB1-H ₆	pSABAD14-738	-	#
<i>Pho</i> RadA _{ΔN38} -GB1-H ₆	pSABAD14-467	-	#
<i>Pho</i> RadA _{ΔN13} -GB1-H ₆	pSABAD14-466	-	#
<i>Pho</i> RadA _{ΔN11} -GB1-H ₆	pSABAD14-371	-	#
<i>Pho</i> RadA _{ΔN6} -GB1-H ₆	pSABAD14-738	-	#
<i>Pho</i> RadA _{ΔN5} -GB1-H ₆	pSABAD14-737	-	#
H ₆ -Smt3- <i>Ssp</i> DnaB ^{Δ275} _{N11}	pSARSF53-HY41	-	#
<i>Ssp</i> DnaB ^{Δ275} _{ΔN10} -GB1-H ₆	pSABAD14-HY42	-	#
H ₆ -GB1- <i>Tvo</i> VMA _{N11}	pSADuet110	-	#
H ₆ -GB1- <i>Pho</i> RadA _{ΔC6}	pSADuet165	-	#
H ₆ -Smt3-A- <i>Npu</i> DnaB ^{Δ290} -A	pCARSF02	-	#
H ₆ -Smt3-A- <i>Tvo</i> VMA-A	pHYRSF175	-	#
H ₆ -Smt3-A- <i>Tvo</i> VMA ^{Δ21} -A	pJORSF73	-	#

#described here

Table S2: Construction of split inteins described in this article

Split fragments	intein	Plasmid name	Oligonucleotides	Template	Ref
<i>Npu</i> DnaE _{N35}		pSARSF53-218	SK092, HK476	pSKDuet16	(Ellilä et al. 2011)
<i>Npu</i> DnaE _{N11}		pSARSF53-756	SK012, SA035	pHYDuet36	(Aranko et al. 2009)
<i>Npu</i> DnaB ^{Δ283} _{ΔC39}		pSARSF53-259	HK151, HK297	pMMDuet19	(Ellilä et al. 2011)
<i>Npu</i> DnaB ^{Δ283} _{ΔC13}		pSARSF53-115	SK012, HK267	pMMDuet19	(Ellilä et al. 2011)
<i>Npu</i> DnaB ^{Δ283} _{N34}		pSARSF53-254	HK151, HK519	pMMDuet19	(Ellilä et al. 2011)
<i>Npu</i> DnaB ^{Δ283} _{N24}		pSARSF53-253	HK151, HK518	pMMDuet19	(Ellilä et al. 2011)
<i>Tvo</i> VMA _{ΔC48}		pSARSF53-343	SK181, HK594	pSKDuet26	(Ellilä et al. 2011)
<i>Tvo</i> VMA _{ΔC16}		pSARSF53-143	SK181, HK331	pSKDuet26	(Ellilä et al. 2011)
<i>Tvo</i> VMA _{ΔC7}		pSARSF53-HY176	SK181, HK346	pSKDuet26	(Ellilä et al. 2011)
<i>Tvo</i> VMA _{N11}		pSARSF53-110	Duet-MCS1-fw, HK236	pSKDuet26	(Ellilä et al. 2011)
<i>Pho</i> RadA _{ΔC46}		pSARSF53-344	HK375, HK593	pHYDuet183	(Ellilä et al. 2011)
<i>Pho</i> RadA _{ΔC14}		pSARSF53-166	HK375, HK387	pHYDuet183	(Ellilä et al. 2011)
<i>Pho</i> RadA _{ΔC6}		pSARSF53-165	HK375, HK393	pHYDuet183	(Ellilä et al. 2011)
<i>Pho</i> RadA _{N38}		pSARSF53-459	HK375, HK658	pHYDuet183	(Ellilä et al. 2011)
<i>Pho</i> RadA _{N13}		pSARSF53-455	HK375, HK656	pHYDuet183	(Ellilä et al. 2011)
<i>Pho</i> RadA _{N11}		pSARSF53-168	SK012, HK386	pHYDuet183	(Ellilä et al. 2011)
<i>Pho</i> RadA _{N6}		pSARSF53-176	SK012, HK406	pHYDuet183	(Ellilä et al. 2011)
<i>Pho</i> RadA _{N5}		pSARSF53-175	SK012, HK405	pHYDuet183	(Ellilä et al. 2011)
<i>Npu</i> DnaE _{C3}		pSABAD14	HK341, SZ015	pSKBAD2	(Iwai et al. 2006)
<i>Npu</i> DnaE _{C2}		pSABAD147	HK340, SZ015	pSKBAD2	(Iwai et al. 2006)
<i>Npu</i> DnaE _{ΔN11}		pSABAD14-HY43	HK145, SK095	pSKDuet16	(Ellilä et al. 2011)
<i>Npu</i> DnaB ^{Δ283} _{C13}		pSABAD14-116	HK268, SZ015	pMMDuet19	(Ellilä et al. 2011)
<i>Npu</i> DnaB ^{Δ283} _{ΔN34}		pSABAD252	HK517, HK212	pMMDuet19	(Ellilä et al. 2011)
<i>Npu</i> DnaB ^{Δ283} _{ΔN24}		pSABAD251	HK516, HK212	pMMDuet19	(Ellilä et al. 2011)
<i>Npu</i> DnaB ^{Δ283} _{ΔN12}		pSABAD14-111	HK261, SZ015	pMMDuet19	(Ellilä et al. 2011)
<i>Tvo</i> VMA _{C16}		pSABAD14-142	HK330, SK182	pSKDuet26	(Ellilä et al. 2011)
<i>Tvo</i> VMA _{C7}		pHYBAD177	HK347, HK158	pSKDuet26	(Ellilä et al. 2011)
<i>Tvo</i> VMA _{ΔN11}		pSABAD14-98	HK225, SK182	pSKDuet26	(Ellilä et al. 2011)
<i>Pho</i> RadA _{C14}		pSABAD14-167	HK388, SZ015	pHYDuet183	(Ellilä et al. 2011)
<i>Pho</i> RadA _{C6}		pSABAD14-172	HK398, SZ015	pHYDuet183	(Ellilä et al. 2011)
<i>Pho</i> RadA _{ΔN38}		pSABAD14-467	HK657, SZ015	pHYDuet183	(Ellilä et al. 2011)
<i>Pho</i> RadA _{ΔN13}		pSABAD14-466	HK655, SZ015	pHYDuet183	(Ellilä et al. 2011)
<i>Pho</i> RadA _{ΔN11}		pSABAD14-371	HK617, SZ015	pHYDuet183	(Ellilä et al. 2011)
<i>Pho</i> RadA _{ΔN6}		pSABAD14-738	SA033, SZ015	pHYDuet183	(Ellilä et al. 2011)
<i>Pho</i> RadA _{ΔN5}		pSABAD14-737	SA032, SZ015	pHYDuet183	(Ellilä et al. 2011)
<i>Ssp</i> DnaB ^{Δ275} _{ΔN10}		pSABAD14-HY42	HK144, HK042	pTWIN2	(Evans & Xu 1999)

Table S3: List of oligonucleotides used

Oligo	Sequence
HK039	5'-CTGGATCCTGTATCTCTGGCGATAGTC
HK040	5'-GTCAAGCTTAGAATTCTAGTTTACGGGGTAG
HK042	5'-TCGGTACCAATAGAGTTGTGTACAATGATGTC
HK129	5'-CGTAACGGAAGGATCCGGATGCATCTCTGGCGATAGTCTG
HK130	5'-CAGACTATCGCCAGAGATGCATCCGGATCCTTCCGTTACG
HK142	5'-CTGATCAGCCTGGCTTAAACAGGAAAAAGAGTTTC
HK143	5'-GAAACTCTTTTTCTCTGTTAAGCCAGGCTGATCAG
HK144	5'-AACATATGGCTAGCACAGGAAAAAGAG
HK145	5'-AACATATGGAATATGGATTATTACCGATTG
HK151	5'-TAGGATCCGGTTGTTTAGCAGGCGATAGTC
HK158	5'-AGAATTCGGTTACGGTGTAGGTTTTG
HK212	5'-GAGGTACCAATGGAATTGTGAACAAT
HK225	5'-AACATATGGATGGCAAGACAATAAAAAATAAAG
HK236	5'-ATTCAAGCTTACGCAAGGTAACCTGGTGTTC
HK261	5'-AACATATGGGATCCGGACTGCAAGTGCCAATTAAG
HK262	5'-ATTAGTAGATAGCTAAGCTTAAGTGCCAATTAAGG
HK263	5'-ATTGGCACTTAAGCTTAGCTATCTACTAATGTCAC
HK264	5'-GTCAAGCTTACGCGTTGTGAAGTACGAGAAGTC
HK267	5'-AATAAGCTTAACCAAGAACGGTGAGGTC
HK268	5'-GGCATATGTTGCATAATTTTGTGCAA
HK297	5'-GTGAAGCTTAATTTCTTGGTAAACTGAGATGTTCT
HK313	5'-GGTGGATCCGGTAAGGCCGATCAGGTGAAAC
HK330	5'-TTCATATGTACGGCAGGAACTTTATAG
HK331	5'-GTCAAGCTTATTCTGGTACGAAAGATCG
HK336	5'-GCTTCATATAAGCTTATTGTTCAATGGTACCCAG n
HK337	5'-TTGAAACAATAAGCTTATATGAAGCCATTTTGGAG
HK338	5'-GCTTCATAGCTTAAGCTTGTTTCAATGGTACCCAG
HK339	5'-ATTGAAACAAGCTTAAGCTATGAAGCCATTTTGG
HK340	5'-TCATATGTCTAATTGTTTCAATGGTACC
HK341	5'-TCATATGGCTTCTAATTGTTTCAATGGTAC
HK346	5'-GCTTCATATAAGCTTATTGTTTCAATGGTACCCAG
HK347	5'-AACATATGGGACTTCTCGTACTTCACAAC
HK370	5'-GTGGATCCGGTGGTAAGGCCGATCAGGTTG
HK375	5'-AAGGATCCGGGAAGTGCTTTGCTAGGGATACCGAA
HK386	5'-GTGTGGTACAGAAGCTTATTCATAATAAACTTC
HK387	5'-GCTTCATATAAGCTTATTGTTTCAATGGTACCCAG
HK388	5'-CCCATATGACCCACAACCTTCATAGC
HK393	5'-TATTATGGAGAAAAGCTTAATTGGGAGCTATGAAG
HK398	5'-ATCATATGGGACTTGTCTCCATAA
HK405	5'-CAGAAGCTTAATCCCTAGCAAAGCACTTC
HK406	5'-CAGAAGCTTAGGTATCCCTAGCAAAGCAC
HK476	5'-ATCAAGCTTAATTATCAACGCTATAAACAG
HK504	5'-TTGTACTGGGTACCTCCCGAGTTGTGAACAATAATATT
HK505	5'-GAACATCTCGCTTACCCCGGAATTCTGGTAGTGATATTTATTGGG
HK506	5'-CCCAATAAATATCACTACCAGAATTCCGGGGTAAAGCGAGATGTTT
HK516	5'-AACATATGAAATCTGGTTTTGCAG
HK517	5'-AACATATGGAAGCTACAATGCAGC
HK518	5'-TGAAGCTTAACCTACTAATTCCTTAATTG
HK519	5'-GTCAAGCTTAGTTCAATGCCAAAAGT
HK593	5'-ATCAAGCTTATCTTCTCAGTACCTCTTCCC
HK594	5'-TTCAAGCTTATGCTTCCATCACGCATTCTCT
HK617	5'-GACATATGAACGATACTGTACCACACATG
HK655	5'-GCATATGACTGTACCACACATGGAATC
HK656	5'-GTGAAGCTTAATCGTTTTTCATAATAAAC
HK657	5'-ACATATGAATGGTTACGCAGTTCC
HK658	5'-CGTAAGCTTAATCGAATGGTAATTCCCC
HK763	5'-TAGGATCCGGTGGTGTCTTAGCAGGCGATAG
HK764	5'-CGTAAGCTTATGCGTTGTGAACAATAATATT
I423	5'-CTGTAGCAGAAAGCGCTAGTGAAGCGACATTCGATAGAG
I424	5'-CTCTATCGAATGTCGCTTCACTAGCGCTTCTGCTACAG
SA032	5'-AGCCATATGACCGAAGTTTATTATGAAAACGATAC
SA033	5'-AGCCATATGGAAGTTTATTATGAAAACGATACTGTACC
SA035	5'-CCAAAGCTTATACTGTCAATATTTCGGTTTTCATAG
SK012	5'-TCCTTACATATGCAGTACAACTTATCCTG
SK092	5'-ACGGATCCTGTTAAGCTATGAAACGGAAATATTG
SK095	5'-TAGGTACCATTGAAACAATTAGAAGCTATG
SK181	5'-AAGGATCCAAGTGCGTATCAGGTGAAACAC
SK182	5'-ATGGTACCTATAACCGTGTGTGAAGTACGAG
SZ015	5'-TGCCAAGCTTATTCGGTTACGGTG
Duet-MCS1-fw	5'-GGATCTCGACGCTCTCCCT