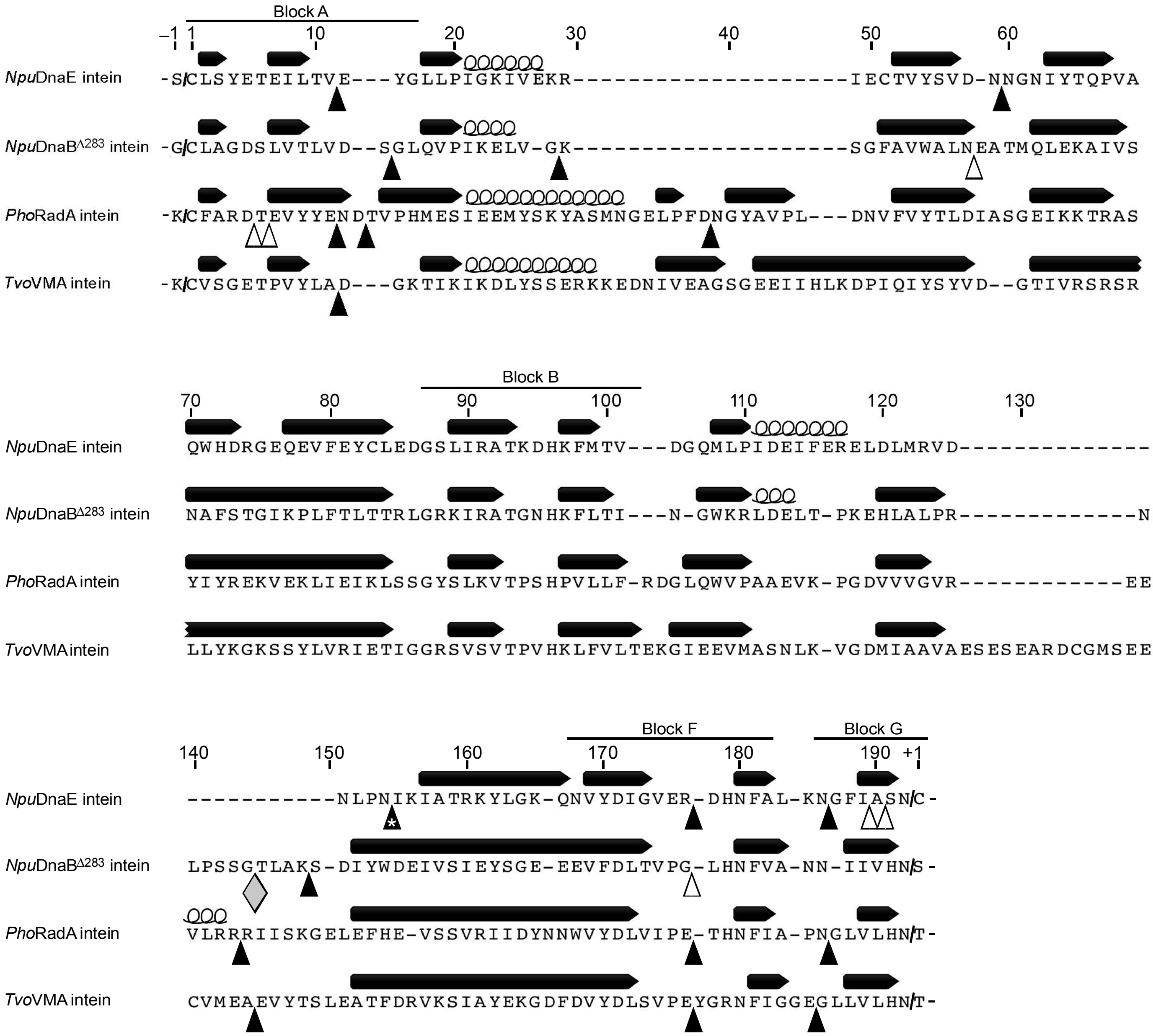

Figure S1: Protein sequences of the inteins used in this study. Sequence alignment of *Npu*DnaE, *Npu*DnaB$^{\Delta 283}$, *Pho*RadA, and *Tvo*VMA, inteins. The sequences were aligned using ClustalW (Thompson 1994) and manually adjusted based on pairwise structural alignments with DALI server (Hasegawa 2009). β-strands and α-helixes 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 *Npu*DnaE intein is marked with an asterisk and the endonuclease domain insertion site in *Npu*DnaB$^{\Delta 283}$ intein is denoted with a diamond in grey. The boundaries between intein and exteins are indicated by slashes.

Supplementary Figure 1

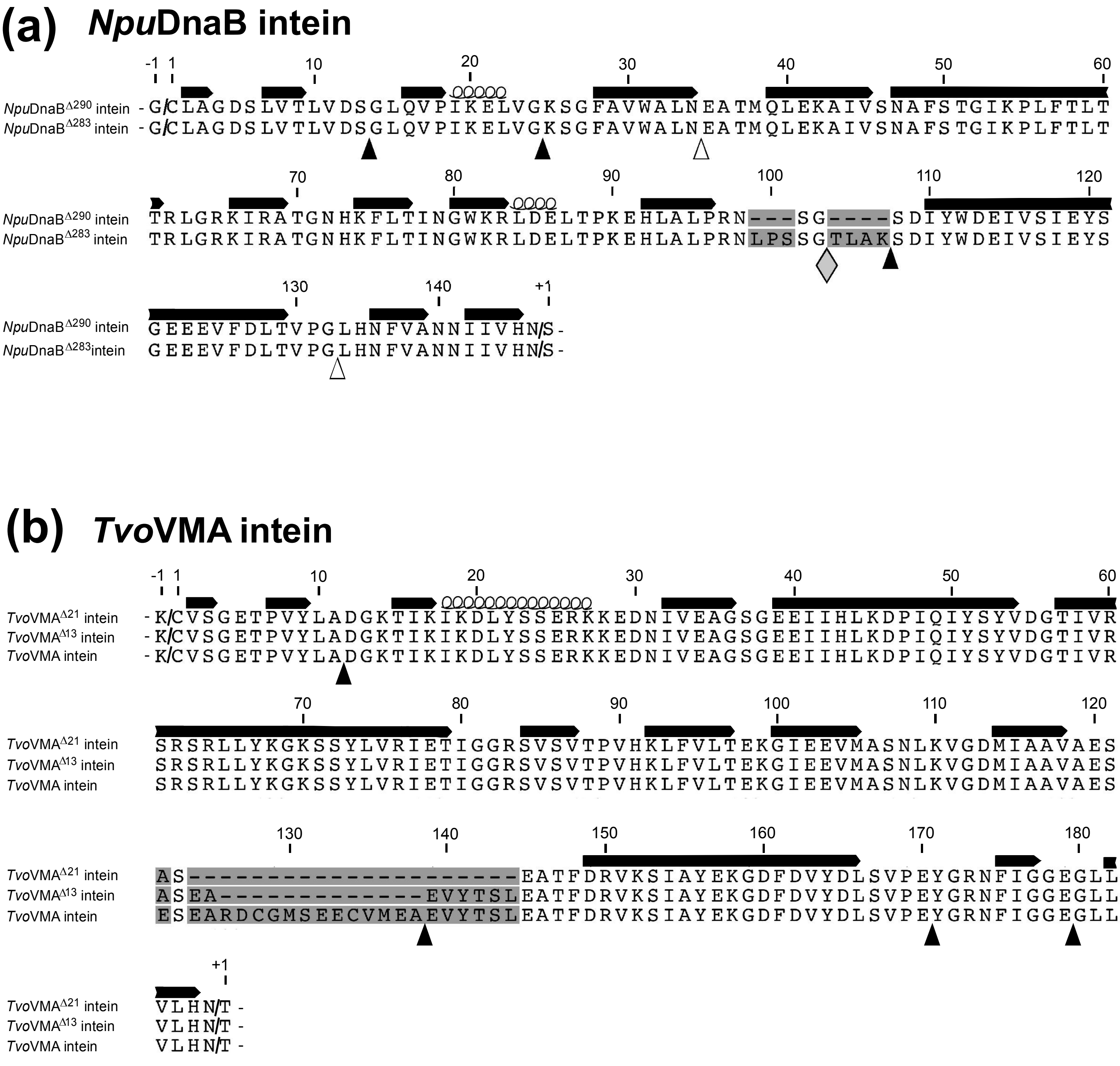

Figure S2: Sequences of the inteins used for structural studies. (a) Sequence alignment of *Npu*DnaB$^{\Delta 283}$ and *Npu*DnaB$^{\Delta 290}$ inteins. (b) Sequence alignment of *Tvo*VMA, *Tvo*VMA$^{\Delta 13}$, and *Tvo*VMA$^{\Delta 21}$ inteins. Split sites in *Npu*DnaB$^{\Delta 290}$ and *Tvo*VMA 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 *Npu*DnaB inteins is shown by a diamond in grey. Secondary structures are indicated above the alightments by filled arrows (β-strands) and squiggles (α-helixes). 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.

Supplementary Figure 2

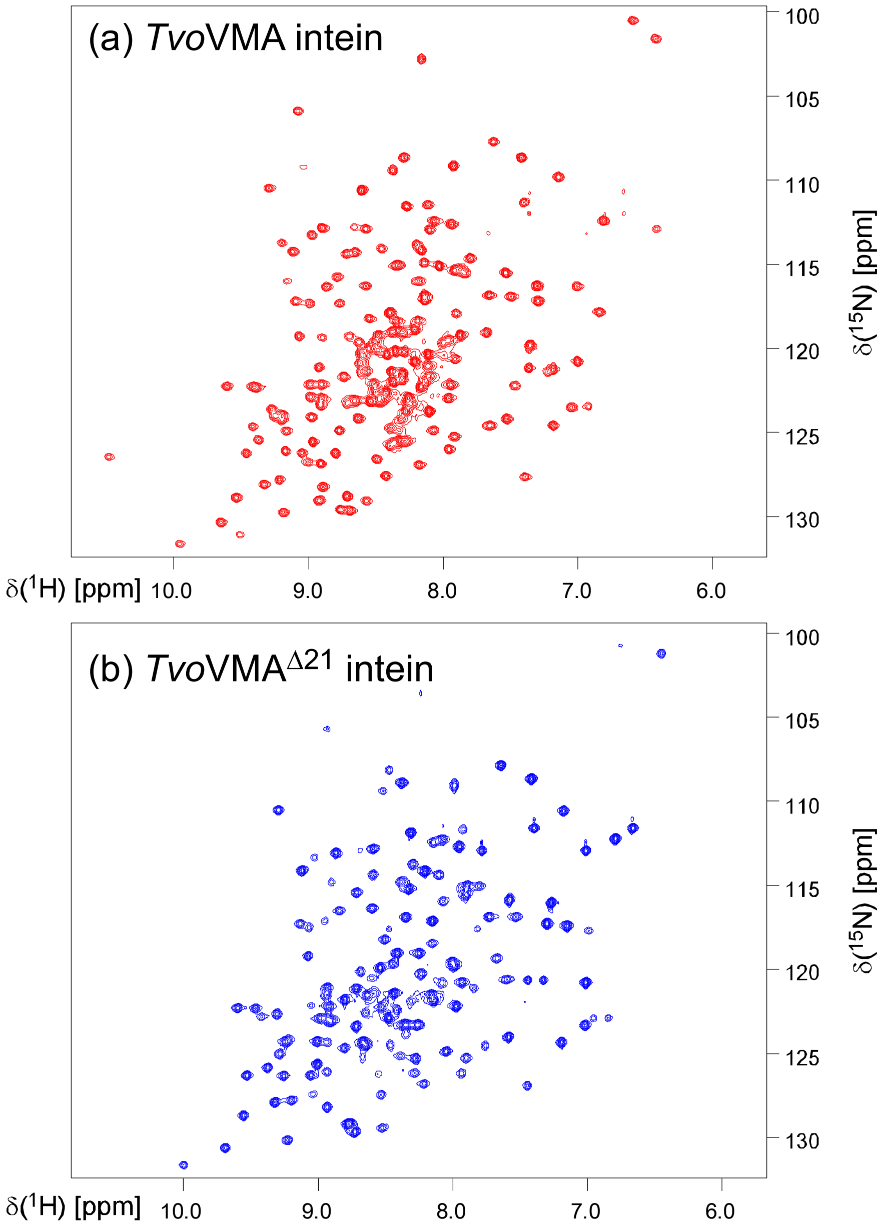

Figure S3: (a) [^{1}H,^{15}N]-TROSY-HSQC spectrum of 0.4 mM *Tvo*VMA intein, 10 mM sodium phosphate, pH 6 recorded at a ^{1}H frequency of 600 MHz at 307 K. (b) [^{1}H,^{15}N]-HSQC spectrum of 0.5 mM *Tvo*VMA$^{\Delta 21}$ intein, 20 mM sodium phosphate, pH 7 recorded at a ^{1}H frequency of 800 MHz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

Supplementary Figure 3

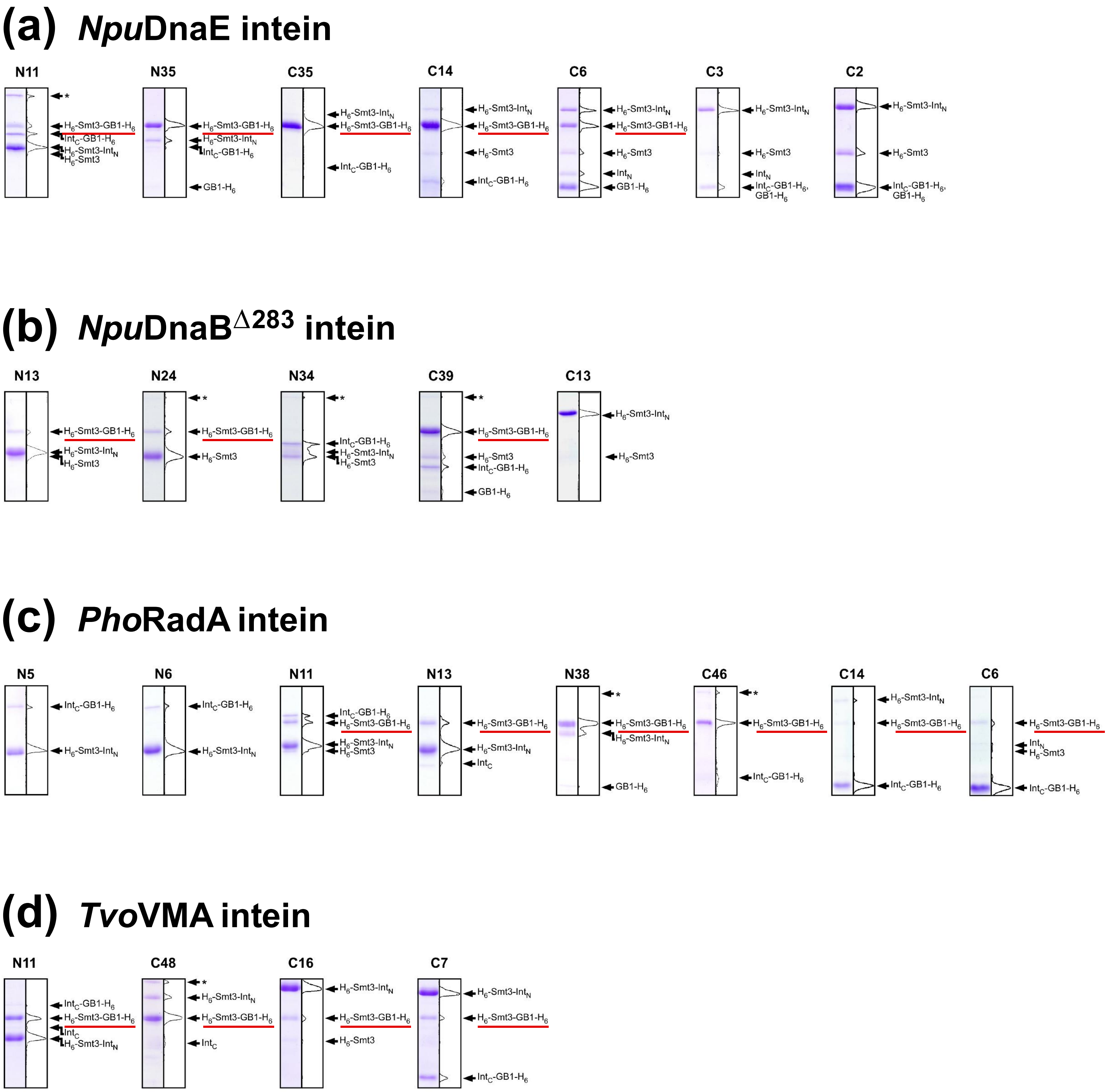

Figure S4: Analysis of *in vivo* PTS by new split inteins by SDS-PAGE. (a) PTS of new split inteins derived from *Npu*DnaE intein and of the previously described split *Npu*DnaE$_{C35}$, *Npu*DnaE$_{C14}$ and *Npu*DnaE$_{C6}$ inteins. (b) PTS of new split inteins derived from *Npu*DnaB$^{\Delta 283}$ intein. (c) PTS of new split inteins derived from *Pho*RadA intein. (d) PTS of new split inteins derived from *Tvo*VMA 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.

Supplementary Figure 4

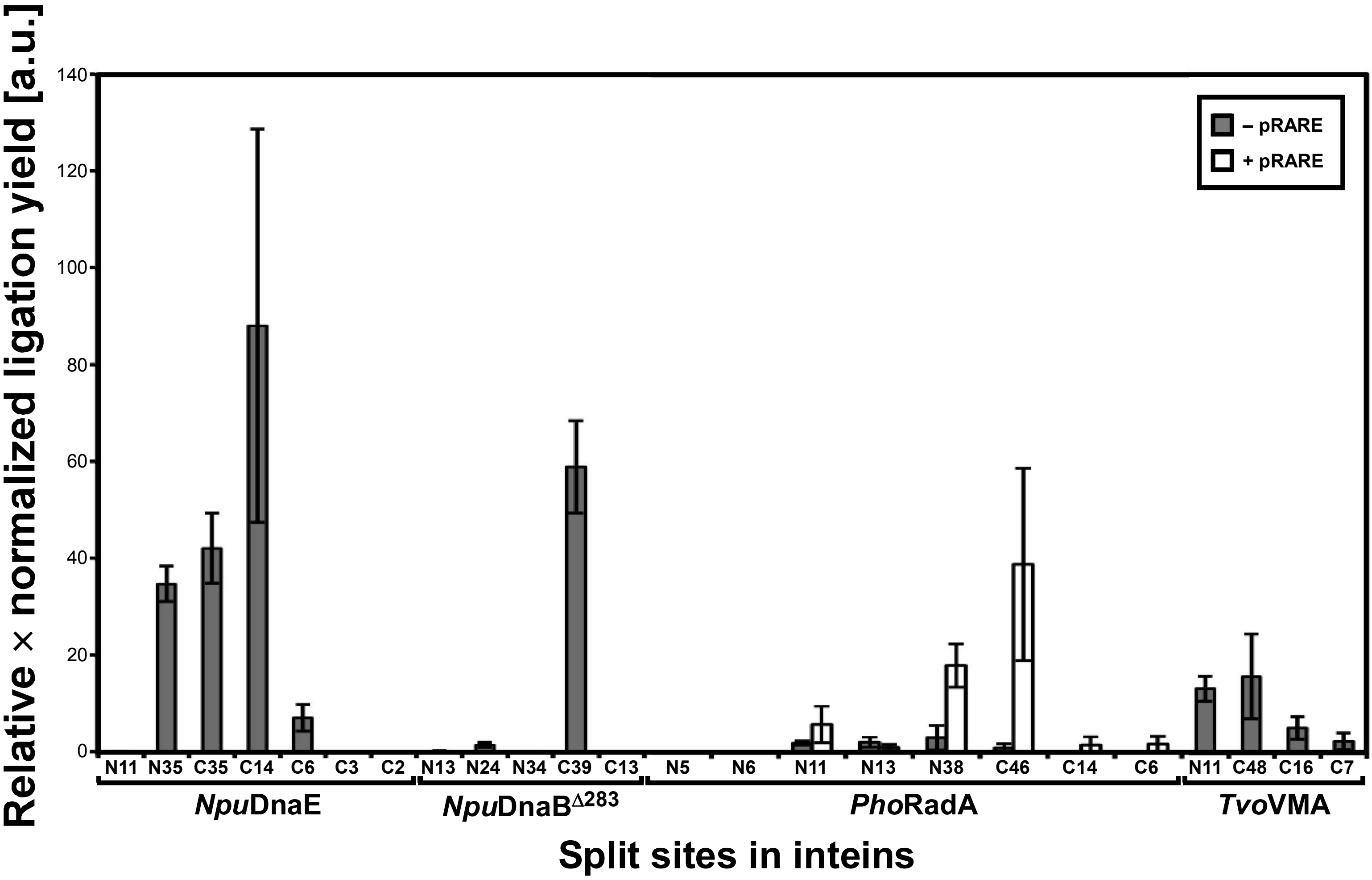

Figure S5: Relative ligation yield multiplied by the normalized ligation yield. Inteins and split sites are indicated below the chart. Data presents mean values ± s.d. (n=3).

Supplementary Figure 5

Block A split inteins

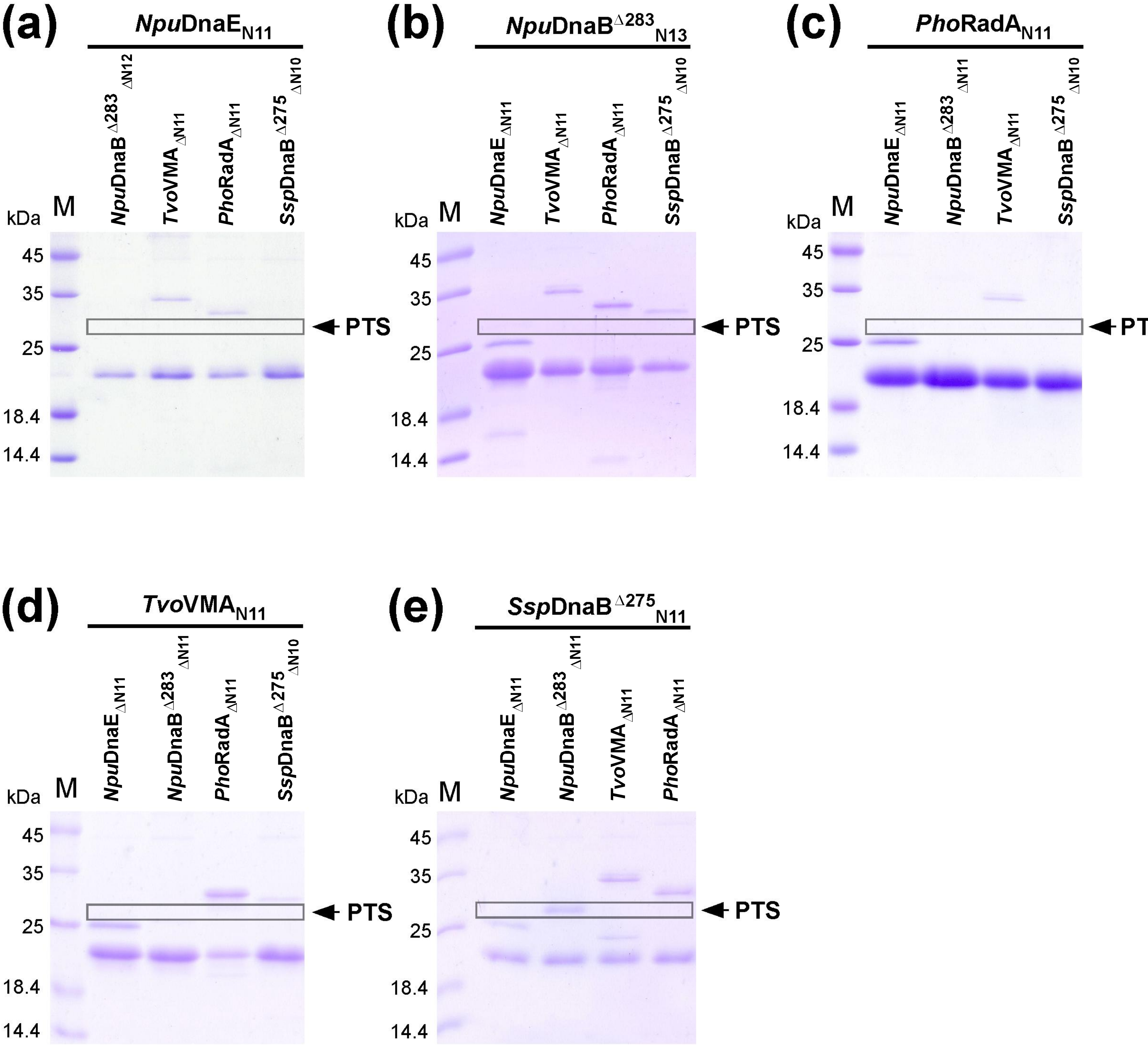

Figure S6: SDS-PAGE analysis of in vivo cross-reactivity among split inteins with split sites near the N terminus. Combinations of the split inteins within the block A are tested. Different pairs are indicated above the lanes. The expected bands by PTS due to cross-activity between different split inteins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

Supplementary Figure 6

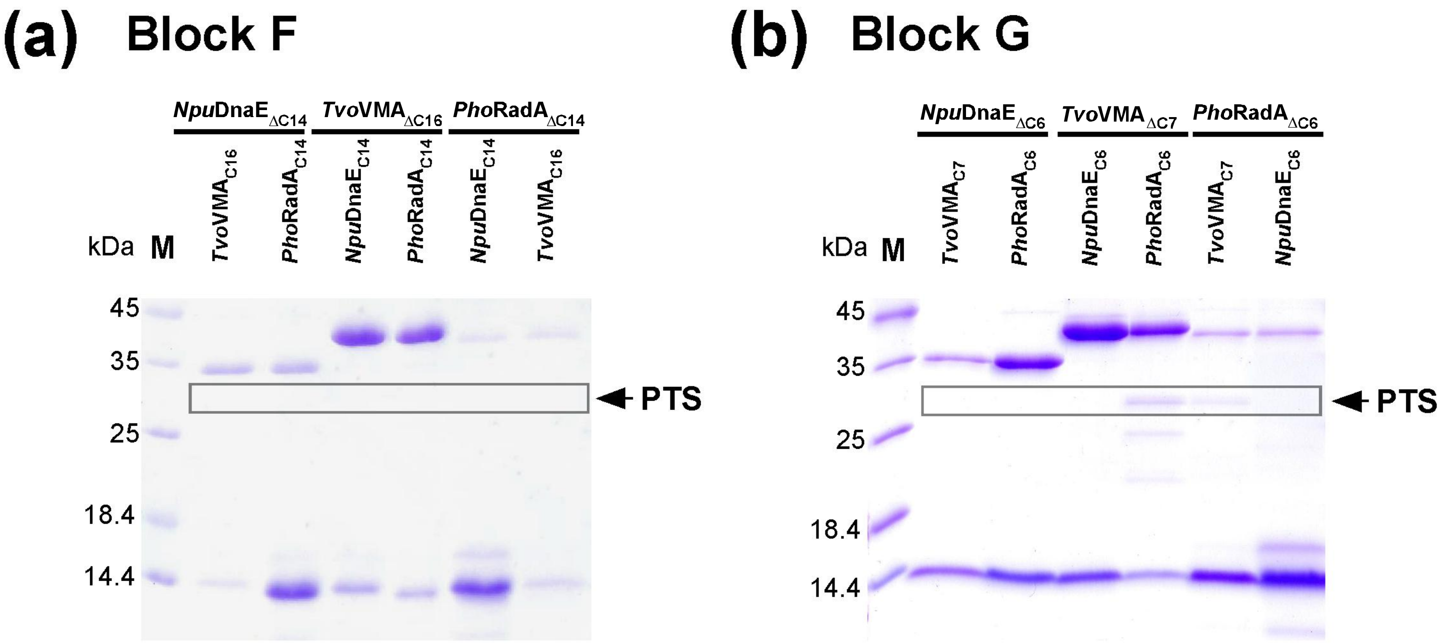

Figure S7: SDS-PAGE analysis of *in vivo* cross-reactivities of different split inteins near the C-terminus. (a) Combinations of different split inteins at the loop within the block F (b) combinations of the split inteins split within the block G. different pairs are indicated above the lanes. The expected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

Supplementary Figure 7

Table S1: Summary of plasmids used in this study

Construct	Plasmid name	Addgene ID	Ref
H_6-Smt3-*Npu*$DnaE_{\Delta C35}$	pSARSF53-1	-	#
H_6-Smt3-*Npu*$DnaE_{\Delta C14}$	pHYRSF53-36	-	(Aranko et al. 2009)
H_6-Smt3-*Npu*$DnaE_{\Delta C6}$	pSARSF53-93	-	#
H_6-Smt3-*Npu*$DnaE_{\Delta C3}$	pSARSF53-HY171	-	#
H_6-Smt3-*Npu*$DnaE_{\Delta C2}$	pSARSF53-HY172	-	#
H_6-Smt3-*Npu*$DnaE_{N35}$	pSARSF53-218	-	#
H_6-Smt3-*Npu*$DnaE_{N11}$	pSARSF53-756	-	#
H_6-Smt3-*Npu*$DnaB^{\Delta 283}{}_{\Delta C39}$	pSARSF53-259	-	#
H_6-Smt3-*Npu*$DnaB^{\Delta 283}{}_{\Delta C13}$	pSARSF53-115	-	#
H_6-Smt3-*Npu*$DnaB^{\Delta 283}{}_{N34}$	pSARSF53-254	-	#
H_6-Smt3-*Npu*$DnaB^{\Delta 283}{}_{N24}$	pSARSF53-253	-	#
H_6-Smt3-*Npu*$DnaB^{\Delta 283}{}_{N13}$	pSARSF53-HY100	-	#
H_6-Smt3-*Tvo*$VMA_{\Delta C48}$	pSARSF53-343	-	#
H_6-Smt3-*Tvo*$VMA_{\Delta C16}$	pSARSF53-143	-	#
H_6-Smt3-*Tvo*$VMA_{\Delta C7}$	pSARSF53-HY176	-	#
H_6-Smt3-*Tvo*VMA_{N11}	pSARSF53-110	-	#
H_6-Smt3-*Pho*$RadA_{\Delta C46}$	pSARSF53-344	-	#
H_6-Smt3-*Pho*$RadA_{\Delta C14}$	pSARSF53-166	-	#
H_6-Smt3-*Pho*$RadA_{\Delta C6}$	pSARSF53-165	-	#
H_6-Smt3-*Pho*$RadA_{N38}$	pSARSF53-459	-	#
H_6-Smt3-*Pho*$RadA_{N13}$	pSARSF53-455	-	#
H_6-Smt3-*Pho*$RadA_{N11}$	pSARSF53-168	-	#
H_6-Smt3-*Pho*$RadA_{N6}$	pSARSF53-176	-	#
H_6-Smt3-*Pho*$RadA_{N5}$	pSARSF53-175	-	#
Npu$DnaE_{C35}$-GB1-H_6	pMHBAD14C	42304	(Buchinger et al 2010)
Npu$DnaE_{C14}$-GB1-H_6	pMKBAD28	45595	(Aranko et al 2013)
Npu$DnaE_{C6}$-GB1-H_6	pHYBAD94	42305	(Oeemig et al 2009)
Npu$DnaE_{C3}$-GB1-H_6	pSABAD148	-	#
Npu$DnaE_{C2}$-GB1-H_6	pSABAD147	-	#
Npu$DnaE_{\Delta N35}$-GB1-H_6	pSABAD219	45596	(Aranko et al 2013)
Npu$DnaE_{\Delta N11}$-GB1-H_6	pSABAD14-HY43	-	#
Npu$DnaB^{\Delta 283}{}_{C39}$-GB1-$H_6$	pSABAD250	45612	(Aranko et al 2013)
Npu$DnaB^{\Delta 283}{}_{C13}$-GB1-$H_6$	pSABAD14-116	-	#
Npu$DnaB^{\Delta 283}{}_{\Delta N34}$-GB1-$H_6$	pSABAD252	-	#
Npu$DnaB^{\Delta 283}{}_{\Delta N24}$-GB1-$H_6$	pSABAD251	-	#
Npu$DnaB^{\Delta 283}{}_{\Delta N12}$-GB1-$H_6$	pSABAD14-111	-	#
TvoVMA_{C48}-GB1-H_6	pSABAD331	45609	(Aranko et al 2013)
TvoVMA_{C16}-GB1-H_6	pSABAD14-142	-	#
TvoVMA_{C7}-GB1-H_6	pHYBAD177	-	#
Tvo$VMA_{\Delta N11}$-GB1-H_6	pSABAD14-98	-	#
Pho$RadA_{C46}$-GB1-H_6	pSABAD332	45610	(Aranko et al 2013)
Pho$RadA_{C14}$-GB1-H_6	pSABAD14-167	-	#
Pho$RadA_{C6}$-GB1-H_6	pSABAD14-172	-	#
Pho$RadA_{\Delta N38}$-GB1-H_6	pSABAD14-467	-	#
Pho$RadA_{\Delta N13}$-GB1-H_6	pSABAD14-466	-	#
Pho$RadA_{\Delta N11}$-GB1-H_6	pSABAD14-371	-	#
Pho$RadA_{\Delta N6}$-GB1-H_6	pSABAD14-738	-	#
Pho$RadA_{\Delta N38}$-GB1-H_6	pSABAD14-467	-	#
Pho$RadA_{\Delta N13}$-GB1-H_6	pSABAD14-466	-	#
Pho$RadA_{\Delta N11}$-GB1-H_6	pSABAD14-371	-	#
Pho$RadA_{\Delta N6}$-GB1-H_6	pSABAD14-738	-	#
Pho$RadA_{\Delta N5}$-GB1-H_6	pSABAD14-737	-	#
H_6-Smt3-*Ssp*$DnaB^{\Delta 275}{}_{N11}$	pSARSF53-HY41	-	#
Ssp$DnaB^{\Delta 275}{}_{\Delta N10}$-GB1-$H_6$	pSABAD14-HY42	-	#
H_6-GB1-*Tvo*VMA_{N11}	pSADuet110	-	#
H_6-GB1-*Pho*$RadA_{\Delta C6}$	pSADuet165	-	#
H_6-Smt3-A_*Npu*$DnaB^{\Delta 290}$_A	pCARSF02	-	#
H_6-Smt3-A_*Tvo*VMA_A	pHYRSF175	-	#
H_6-Smt3-A_*Tvo*$VMA^{\Delta 21}$_A	pJORSF73	-	#

[#] described here

Table S1: Summary of plasmids used in this study

Construct	Plasmid name	Addgene ID	Ref
H_6-Smt3-*Npu*Dna$E_{\Delta C35}$	pSARSF53-1	-	#
H_6-Smt3-*Npu*Dna$E_{\Delta C14}$	pHYRSF53-36	-	(Aranko et al. 2009)
H_6-Smt3-*Npu*Dna$E_{\Delta C6}$	pSARSF53-93	-	#
H_6-Smt3-*Npu*Dna$E_{\Delta C3}$	pSARSF53-HY171	-	#
H_6-Smt3-*Npu*Dna$E_{\Delta C2}$	pSARSF53-HY172	-	#
H_6-Smt3-*Npu*DnaE_{N35}	pSARSF53-218	-	#
H_6-Smt3-*Npu*DnaE_{N11}	pSARSF53-756	-	#
H_6-Smt3-*Npu*Dna$B^{\Delta 283}{}_{\Delta C39}$	pSARSF53-259	-	#
H_6-Smt3-*Npu*Dna$B^{\Delta 283}{}_{\Delta C13}$	pSARSF53-115	-	#
H_6-Smt3-*Npu*Dna$B^{\Delta 283}{}_{N34}$	pSARSF53-254	-	#
H_6-Smt3-*Npu*Dna$B^{\Delta 283}{}_{N24}$	pSARSF53-253	-	#
H_6-Smt3-*Npu*Dna$B^{\Delta 283}{}_{N13}$	pSARSF53-HY100	-	#
H_6-Smt3-*Tvo*VM$A_{\Delta C48}$	pSARSF53-343	-	#
H_6-Smt3-*Tvo*VM$A_{\Delta C16}$	pSARSF53-143	-	#
H_6-Smt3-*Tvo*VM$A_{\Delta C7}$	pSARSF53-HY176	-	#
H_6-Smt3-*Tvo*VMA_{N11}	pSARSF53-110	-	#
H_6-Smt3-*Pho*Rad$A_{\Delta C46}$	pSARSF53-344	-	#
H_6-Smt3-*Pho*Rad$A_{\Delta C14}$	pSARSF53-166	-	#
H_6-Smt3-*Pho*Rad$A_{\Delta C6}$	pSARSF53-165	-	#
H_6-Smt3-*Pho*RadA_{N38}	pSARSF53-459	-	#
H_6-Smt3-*Pho*RadA_{N13}	pSARSF53-455	-	#
H_6-Smt3-*Pho*RadA_{N11}	pSARSF53-168	-	#
H_6-Smt3-*Pho*RadA_{N6}	pSARSF53-176	-	#
H_6-Smt3-*Pho*RadA_{N5}	pSARSF53-175	-	#
*Npu*DnaE_{C35}-GB1-H_6	pMHBAD14C	42304	(Buchinger et al 2010)
*Npu*DnaE_{C14}-GB1-H_6	pMKBAD28	45595	(Aranko et al 2013)
*Npu*DnaE_{C6}-GB1-H_6	pHYBAD94	42305	(Oeemig et al 2009)
*Npu*DnaE_{C3}-GB1-H_6	pSABAD148	-	#
*Npu*DnaE_{C2}-GB1-H_6	pSABAD147	-	#
*Npu*Dna$E_{\Delta N35}$-GB1-H_6	pSABAD219	45596	(Aranko et al 2013)
*Npu*Dna$E_{\Delta N11}$-GB1-H_6	pSABAD14-HY43	-	#
*Npu*Dna$B^{\Delta 283}{}_{C39}$-GB1-H_6	pSABAD250	45612	(Aranko et al 2013)
*Npu*Dna$B^{\Delta 283}{}_{C13}$-GB1-H_6	pSABAD14-116	-	#
*Npu*Dna$B^{\Delta 283}{}_{\Delta N34}$-GB1-$H_6$	pSABAD252	-	#
*Npu*Dna$B^{\Delta 283}{}_{\Delta N24}$-GB1-$H_6$	pSABAD251	-	#
*Npu*Dna$B^{\Delta 283}{}_{\Delta N12}$-GB1-$H_6$	pSABAD14-111	-	#
*Tvo*VMA_{C48}-GB1-H_6	pSABAD331	45609	(Aranko et al 2013)
*Tvo*VMA_{C16}-GB1-H_6	pSABAD14-142	-	#
*Tvo*VMA_{C7}-GB1-H_6	pHYBAD177	-	#
*Tvo*VM$A_{\Delta N11}$-GB1-H_6	pSABAD14-98	-	#
*Pho*RadA_{C46}-GB1-H_6	pSABAD332	45610	(Aranko et al 2013)
*Pho*RadA_{C14}-GB1-H_6	pSABAD14-167	-	#
*Pho*RadA_{C6}-GB1-H_6	pSABAD14-172	-	#
*Pho*Rad$A_{\Delta N38}$-GB1-H_6	pSABAD14-467	-	#
*Pho*Rad$A_{\Delta N13}$-GB1-H_6	pSABAD14-466	-	#
*Pho*Rad$A_{\Delta N11}$-GB1-H_6	pSABAD14-371	-	#
*Pho*Rad$A_{\Delta N6}$-GB1-H_6	pSABAD14-738	-	#
*Pho*Rad$A_{\Delta N38}$-GB1-H_6	pSABAD14-467	-	#
*Pho*Rad$A_{\Delta N13}$-GB1-H_6	pSABAD14-466	-	#
*Pho*Rad$A_{\Delta N11}$-GB1-H_6	pSABAD14-371	-	#
*Pho*Rad$A_{\Delta N6}$-GB1-H_6	pSABAD14-738	-	#
*Pho*Rad$A_{\Delta N5}$-GB1-H_6	pSABAD14-737	-	#
H_6-Smt3-*Ssp*Dna$B^{\Delta 275}{}_{N11}$	pSARSF53-HY41	-	#
*Ssp*Dna$B^{\Delta 275}{}_{\Delta N10}$-GB1-$H_6$	pSABAD14-HY42	-	#
H_6-GB1-*Tvo*VMA_{N11}	pSADuet110	-	#
H_6-GB1-*Pho*Rad$A_{\Delta C6}$	pSADuet165	-	#
H_6-Smt3-A_*Npu*Dna$B^{\Delta 290}$_A	pCARSF02	-	#
H_6-Smt3-A_*Tvo*VMA_A	pHYRSF175	-	#
H_6-Smt3-A_*Tvo*VM$A^{\Delta 21}$_A	pJORSF73	-	#

[#]described here

Table S2: Construction of split inteins described in this article

Split intein fragments	Plasmid name	Oligonucleotides	Template	Ref
*Npu*DnaE$_{N35}$	pSARSF53-218	SK092, HK476	pSKDuet16	(Ellilä et al. 2011)
*Npu*DnaE$_{N11}$	pSARSF53-756	SK012, SA035	pHYDuet36	(Aranko et al. 2009)
*Npu*DnaB$^{\Delta 283}{}_{\Delta C39}$	pSARSF53-259	HK151, HK297	pMMDuet19	(Ellilä et al. 2011)
*Npu*DnaB$^{\Delta 283}{}_{\Delta C13}$	pSARSF53-115	SK012, HK267	pMMDuet19	(Ellilä et al. 2011)
*Npu*DnaB$^{\Delta 283}{}_{N34}$	pSARSF53-254	HK151, HK519	pMMDuet19	(Ellilä et al. 2011)
*Npu*DnaB$^{\Delta 283}{}_{N24}$	pSARSF53-253	HK151, HK518	pMMDuet19	(Ellilä et al. 2011)
*Tvo*VMA$_{\Delta C48}$	pSARSF53-343	SK181, HK594	pSKDuet26	(Ellilä et al. 2011)
*Tvo*VMA$_{\Delta C16}$	pSARSF53-143	SK181, HK331	pSKDuet26	(Ellilä et al. 2011)
*Tvo*VMA$_{\Delta C7}$	pSARSF53-HY176	SK181, HK346	pSKDuet26	(Ellilä et al. 2011)
*Tvo*VMA$_{N11}$	pSARSF53-110	Duet-MCS1-fw, HK236	pSKDuet26	(Ellilä et al. 2011)
*Pho*RadA$_{\Delta C46}$	pSARSF53-344	HK375, HK593	pHYDuet183	(Ellilä et al. 2011)
*Pho*RadA$_{\Delta C14}$	pSARSF53-166	HK375, HK387	pHYDuet183	(Ellilä et al. 2011)
*Pho*RadA$_{\Delta C6}$	pSARSF53-165	HK375, HK393	pHYDuet183	(Ellilä et al. 2011)
*Pho*RadA$_{N38}$	pSARSF53-459	HK375, HK658	pHYDuet183	(Ellilä et al. 2011)
*Pho*RadA$_{N13}$	pSARSF53-455	HK375, HK656	pHYDuet183	(Ellilä et al. 2011)
*Pho*RadA$_{N11}$	pSARSF53-168	SK012, HK386	pHYDuet183	(Ellilä et al. 2011)
*Pho*RadA$_{N6}$	pSARSF53-176	SK012, HK406	pHYDuet183	(Ellilä et al. 2011)
*Pho*RadA$_{N5}$	pSARSF53-175	SK012, HK405	pHYDuet183	(Ellilä et al. 2011)
*Npu*DnaE$_{C3}$	pSABAD14	HK341, SZ015	pSKBAD2	(Iwai et al. 2006)
NpuDnaE$_{C2}$	pSABAD147	HK340, SZ015	pSKBAD2	(Iwai et al. 2006)
NpuDnaE$_{\Delta N11}$	pSABAD14-HY43	HK145, SK095	pSKDuet16	(Ellilä et al. 2011)
NpuDnaB$^{\Delta 283}{}_{C13}$	pSABAD14-116	HK268, SZ015	pMMDuet19	(Ellilä et al. 2011)
NpuDnaB$^{\Delta 283}{}_{\Delta N34}$	pSABAD252	HK517, HK212	pMMDuet19	(Ellilä et al. 2011)
NpuDnaB$^{\Delta 283}{}_{\Delta N24}$	pSABAD251	HK516, HK212	pMMDuet19	(Ellilä et al. 2011)
NpuDnaB$^{\Delta 283}{}_{\Delta N12}$	pSABAD14-111	HK261, SZ015	pMMDuet19	(Ellilä et al. 2011)
*Tvo*VMA$_{C16}$	pSABAD14-142	HK330, SK182	pSKDuet26	(Ellilä et al. 2011)
*Tvo*VMA$_{C7}$	pHYBAD177	HK347, HK158	pSKDuet26	(Ellilä et al. 2011)
*Tvo*VMA$_{\Delta N11}$	pSABAD14-98	HK225, SK182	pSKDuet26	(Ellilä et al. 2011)
*Pho*RadA$_{C14}$	pSABAD14-167	HK388, SZ015	pHYDuet183	(Ellilä et al. 2011)
*Pho*RadA$_{C6}$	pSABAD14-172	HK398, SZ015	pHYDuet183	(Ellilä et al. 2011)
*Pho*RadA$_{\Delta N38}$	pSABAD14-467	HK657, SZ015	pHYDuet183	(Ellilä et al. 2011)
*Pho*RadA$_{\Delta N13}$	pSABAD14-466	HK655, SZ015	pHYDuet183	(Ellilä et al. 2011)
*Pho*RadA$_{\Delta N11}$	pSABAD14-371	HK617, SZ015	pHYDuet183	(Ellilä et al. 2011)
*Pho*RadA$_{\Delta N6}$	pSABAD14-738	SA033, SZ015	pHYDuet183	(Ellilä et al. 2011)
*Pho*RadA$_{\Delta N5}$	pSABAD14-737	SA032, SZ015	pHYDuet183	(Ellilä et al. 2011)
*Ssp*DnaB$^{\Delta 275}{}_{\Delta N10}$	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’-GAAACTCTTTTTCCTGTTTAAGCCAGGCTGATCAG
HK144	5’-AACATATGGCTAGCACAGGAAAAAGAG
HK145	5’-AACATATGGAATATGGATTATTACCGATTG
HK151	5’-TAGGATCCGGTTGTTTAGCAGGCGATAGTC
HK158	5’-AGAATTCCGTTACGGTGTAGGTTTTG
HK212	5’-GAGGTACCAATGGAATTGTGAACAAT
HK225	5’-AACATATGGATGGCAAGACAATAAAAATAAAG
HK236	5’-ATTCAAGCTTACGCAAGGTAAACTGGTGTTTC
HK261	5’-AACATATGGGATCCGGACTGCAAGTGCCAATTAAG
HK262	5’-ATTAGTAGATAGCTAAGCTTAAGTGCCAATTAAGG
HK263	5’-ATTGGCACTTAAGCTTAGCTATCTACTAATGTCAC
HK264	5’-GTCAAGCTTACGCGTTGTGAAGTACGAGAAGTC
HK267	5’-AATAAGCTTAACCAGGAACGGTGAGGTC
HK268	5’-GGCATATGTTGCATAATTTTGTTGCAA
HK297	5’-GTGAAGCTTAATTTCTTGGTAAACTGAGATGTTCT
HK313	5’-GGTGGATCCGGTAAGGCCGTATCAGGTGAAAC
HK330	5’-TTCATATGTACGGCAGGAACTTTATAG
HK331	5’-GTCAAGCTTATTCTGGTACGGAAAGATCG
HK336	5’-GCTTCATATAAGCTTATTGTTTCAATGGTACCCAG n
HK337	5’-TTGAAACAATAAGCTTATATGAAGCCATTTTTGAG
HK338	5’-GCTTCATAGCTTAAGCTTGTTTCAATGGTACCCAG
HK339	5’-ATTGAAACAAGCTTAAGCTATGAAGCCATTTTTG
HK340	5’-TCATATGTCTAATTGTTTCAATGGTACC
HK341	5’-TCATATGGCTTCTAATTGTTTCAATGGTAC
HK346	5’-GCTTCATATAAGCTTATTGTTTCAATGGTACCCAG
HK347	5’-AACATATGGGACTTCTCGTACTTCACAAC
HK370	5’-GTGGATCCGGTGGTAAGGCCGTATCAGGTG
HK375	5’-AAGGATCCGGGAAGTGCTTTGCTAGGGATACCGAA
HK386	5’-GTGTGGTACAGAAGCTTATTCATAATAAACTTC
HK387	5’-GCTTCATATAAGCTTATTGTTTCAATGGTACCCAG
HK388	5’-CCCATATGACCCACAACTTCATAGC
HK393	5’-TATTATGGAGAAAAGCTTAATTGGGAGCTATGAAG
HK398	5’-ATCATATGGGACTTGTTCTCCATAA
HK405	5’-CAGAAGCTTAATCCCTAGCAAAGCACTTC
HK406	5’-CAGAAGCTTAGGTATCCCTAGCAAAGCAC
HK476	5’-ATCAAGCTTAATTATCAACGCTATAAACAG
HK504	5’-TTGTACTGGGTACCTCCCGAGTTGTGAACAATAATATT
HK505	5’-GAACATCTCGCTTTACCCCGGAATTCTGGTAGTGATATTTATTGGG
HK506	5’-CCCAATAAATATCACTACCAGAATTCCGGGGTAAAGCGAGATGTTC
HK516	5’-AACATATGAAATCTGGTTTTGCAG
HK517	5’-AACATATGGAAGCTACAATGCAGC
HK518	5’-TGAAGCTTAACCTACTAATTCCTTAATTG
HK519	5’-GTCAAGCTTAGTTCAATGCCCAAACTG
HK593	5’-ATCAAGCTTATCTTCTCAGTACCTCTTCCC
HK594	5’-TTCAAGCTTATGCTTCCATCACGCATTCCTC
HK617	5’-GACATATGAACGATACTGTACCACACATG
HK655	5’-GCATATGACTGTACCACACATGGAATC
HK656	5’-GTGAAGCTTAATCGTTTTCATAATAAAC
HK657	5’-ACATATGAATGGTTACGCAGTTCC
HK658	5’-CGTAAGCTTAATCGAATGGTAATTCCCC
HK763	5’-TAGGATCCGGTGGTGCTTTAGCAGGCGATAG
HK764	5’-CGTAAGCTTATGCGTTGTGAACAATAATATT
I423	5’-CTGTAGCAGAAAGCGCTAGTGAAGCGACATTCGATAGAG
I424	5’-CTCTATCGAATGTCGCTTCACTAGCGCTTTCTGCTACAG
SA032	5’-AGCCATATGACCGAAGTTTATTATGAAAACGATAC
SA033	5’-AGCCATATGGAAGTTTATTATGAAAACGATACTGTACC
SA035	5’-CCAAAGCTTATACTGTCAATATTTCCGTTTCATAG
SK012	5’-TCCTTACATATGCAGTACAAACTTATCCTG
SK092	5’-ACGGATCCTGTTTAAGCTATGAAACGGAAATATTG
SK095	5’-TAGGTACCATTGAAACAATTAGAAGCTATG
SK181	5’-AAGGATCCAAGTGCGTATCAGGTGAAACAC
SK182	5’-ATGGTACCTATAACCGTGTTGTGAAGTACGAG
SZ015	5’-TGCCAAGCTTATTCCGTTACGGTG
Duet-MCS1-fw	5’-GGATCTCGACGCTCTCCCT