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Supplementary information

Creating bottom-up RNA transfer vehicles from synthetic protein assemblies

In the format provided by the authors and unedited

Creating bottom-up RNA transfer vehicles from synthetic protein assemblies

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Figures, data, and information to supplement the main manuscript.

Supplementary Note 1 | Detailed description of the STV screening and reporter system

The Split-luc reporter system quantifies three sequential steps in the STV workflow in a single experiment. STV release from producer cells is monitored by complementation of HiBiT tag[1], which is part of the STV protein, with externally supplemented LgBiT protein. The addition of Furimazine (NanoLuciferase substrate) induces a light signal which is proportional to the amount of STV/HiBiT protein present in the supernatant. STV Uptake into target cells is measured by intracellular complementation of reporter cell expressed LgBiT and STV-fused HiBiT tag. Functional RNA transfer is reported by the reconstitution of wild-type Firefly luciferase through coiled-coil assisted split intein splicing of the C-split part of Firefly luciferase, expressed in reporter cells, and STV delivered mRNA coding for the N-split part of Firefly luciferase. Upon cell entry, the mRNA is expressed, the affinity of the N5/N6 coils brings the GP41-1 split intein in proximity and induces splicing to reconstitute full-length Firefly luciferase that reports efficiency of mRNA delivery[2,3].

Architecture of the reporter system

1. Reporter cell line

The reporter cell line stably expresses two components: LgBiT, which is the large fragment of NanoLuciferase. LgBiT resides in the cytosol and can complement with HiBiT to form active NanoLuciferase. And C-Fluc fused to two helper modules. The first is the heterodimeric coiled-coil N6. The second is the C intein of the GP41-1 split intein. This fusion enables conditional reconstitution of full-length Firefly luciferase only when the matching N-Fluc fusion is present in the same cell.

2. Producer cell configuration

Producer cells express the STV protein assembly together with a PP7-tagged cargo mRNA. The cargo encodes N-Fluc that is fused to the N intein GP41-1 and the N5 coiled-coil partner. The PP7 hairpins allow selective packaging through a cognate PP7 binding protein in the STV architecture.

3. STV constructs

The STV constructs carry a HiBiT tag. HiBiT complements with LgBiT in supernatant or target cells to form an active NanoLuciferase enzyme.

Readout of the reporter system

1. STV release from producer cells

Supernatants from producer cells contain HiBiT-tagged STV particles. In the release assay, exogenous LgBiT present in the detection reagent complements HiBiT and generates a light signal. The signal scales with the number of HiBiT-tagged particles and reports the efficiency of assembly and budding.

2. STV uptake by reporter cells

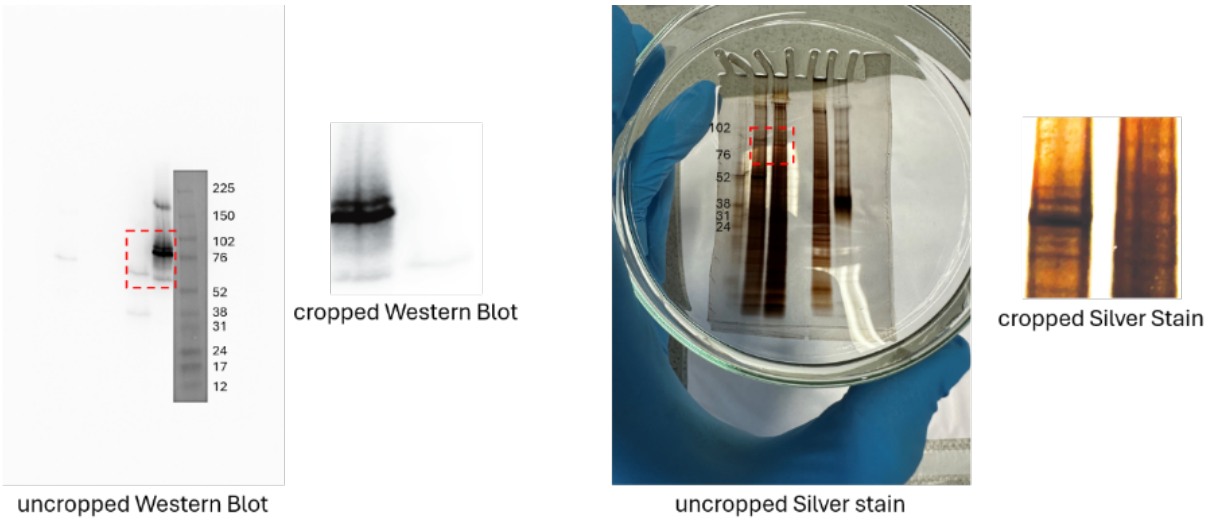
Reporter cells express intracellular LgBiT. After exposure to STVs and subsequent uptake, HiBiT complements with cellular LgBiT and produces a light signal in cell lysates. The signal requires particle binding and internalization, which makes HiBiT accessible in the cytosol. This readout is independent of RNA packaging and translation and therefore isolates the entry step.

3. Functional RNA transfer

The reporter cells additionally express C-Fluc fused to an N6 coil and the GP41-1 C intein. The STV expressing producer cell packages a PP7-tagged mRNA that encodes N-Fluc fused to N5 and the GP41-1 N intein. Delivery of this mRNA and its translation in the reporter cell produces the N-Fluc fusion protein. The N5 and N6 coils heterodimerize and bring the two split intein halves into proximity. The GP41-1 split intein performs protein trans splicing and generates a covalently joined, wild-type Firefly luciferase that is measured with luciferin.

Supplementary Figures

a



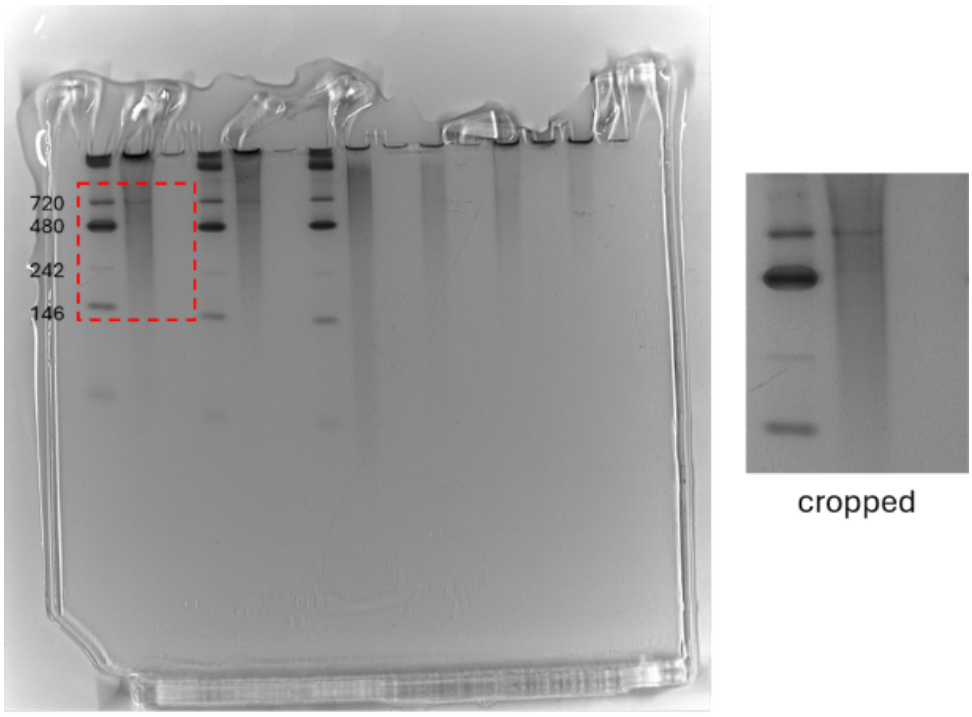
uncropped Western Blot

cropped Western Blot

uncropped Silver stain

cropped Silver Stain

b



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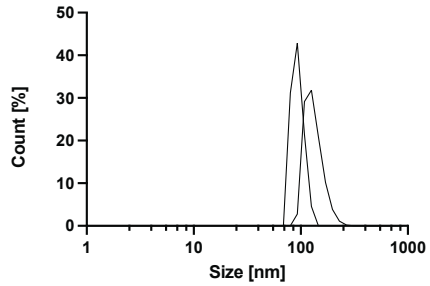
Supplementary Fig. 1 | Uncropped Western Blots and protein gels. a, Full-size western blot image and silver stain corresponding to Extended Data Fig. 5a. **b,** Uncropped native page of Extended Data Fig. 6e.

a

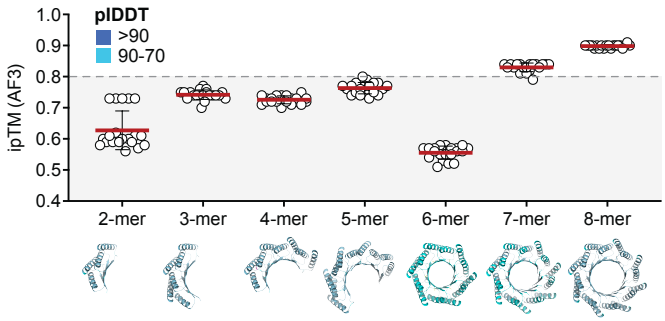


b

Vector	Volume (µL)	RNA content (pg)	STV protein molecules (fmol)	Particle number
STV-C8 (uncon.)	1	1	0.27	2.4-36 e4
LNP	1	110.000	NA	1.3-16 e5

Supplementary Fig. 2 | Additional characterization of STV-C8 vesicle size and content. a, Analysis of purified STV-C8 particle size by DLS in duplicates. **b,** Summary of STV-C8 particle characteristics in comparison to LNPs.

a



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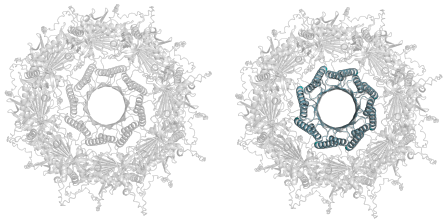
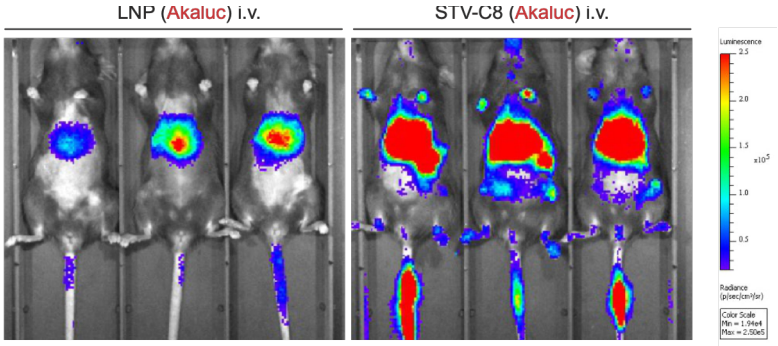
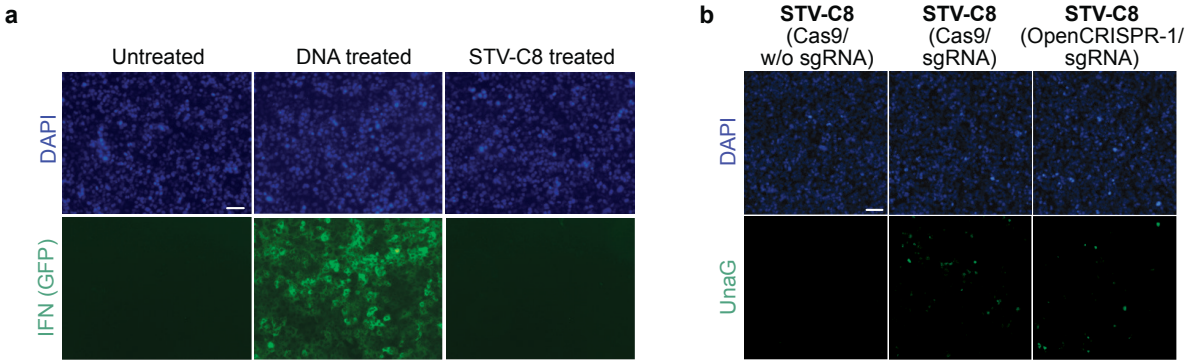


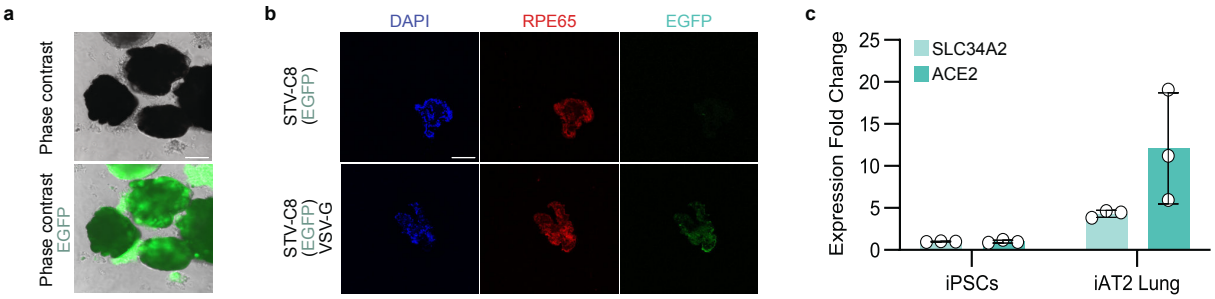
Supplementary Fig. 3 | Modeling of the STV-C8 structural features. a, AlphaFold3-based prediction of the HE0690 oligomeric state. An ipTM threshold of 0.8 is considered as highly confident. **b,** Structural alignment of the predicted HE0690 scaffold (blue) with the STV-C8 oligomer (grey).



Supplementary Fig. 4 | *in vivo* comparison of STV-C8 and LNP-mediated mRNA delivery. Female C57BL/6 mice (n = 3) were intravenously injected with LNPs or STV-C8 carrying Akaluc mRNA and imaged 24 h later after substrate administration.

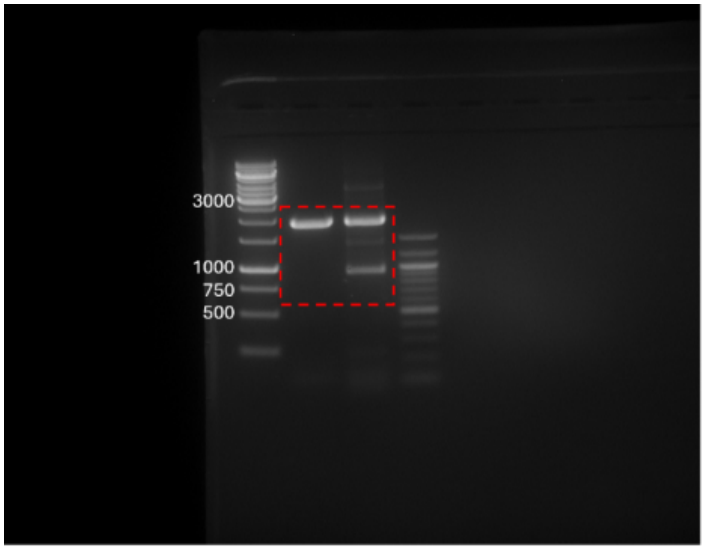


Supplementary Fig. 5 | Additional probing of immunogenicity and cargo programmability. a, Induction of GFP expression under the control of the IFN-β promoter in A549 reporter cells upon treatment with STV-C8 or plasmid transfection (scale bar: 50 µm). **b,** Imaging of TLR reporter cells 3 d after treatment with STV-C8 vehicles containing CRISPR gene editing systems (scale bar: 50 µm).



Supplementary Fig. 6 | Further characterization of RPE spheroid and lung cell models. a, Imaging of STV-C8(EGFP) treated RPE spheroids (scale bar: 100 µm). **b,** Confocal microscopy imaging of STV-C8(EGFP) treated and immunostained spheroid slices (scale bar: 100 µm). **c,** RT-qPCR characterization of the lung-specific AT2 marker gene and ACE2 in iAT2 differentiated cells (mean ± s.d. for n = 3 biological replicates).

a



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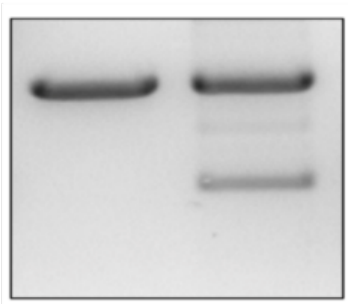

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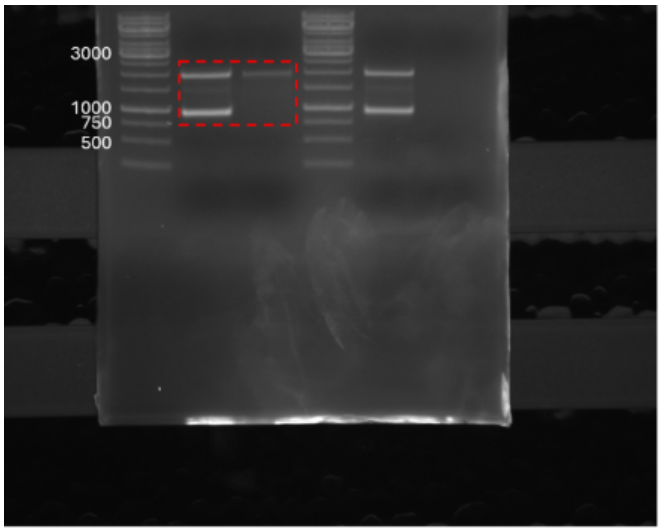

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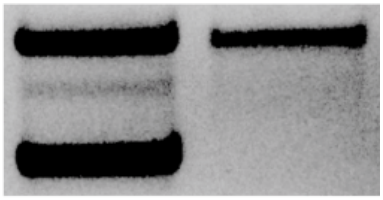

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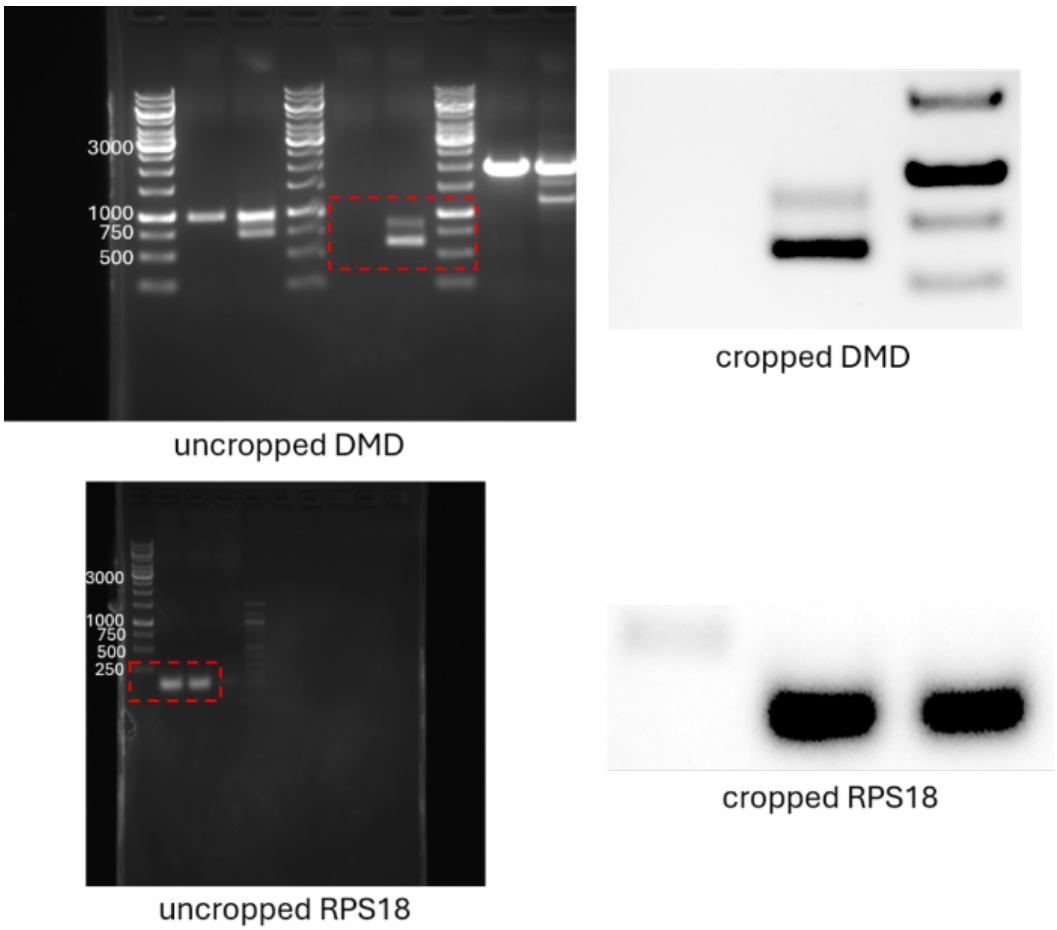
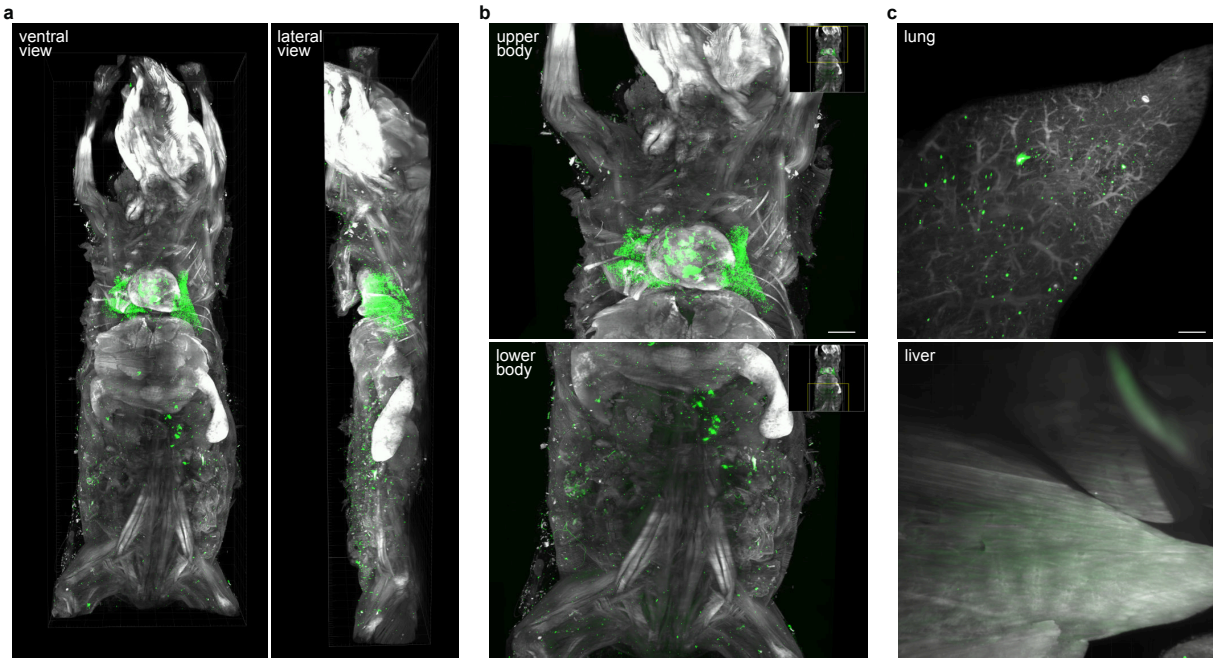
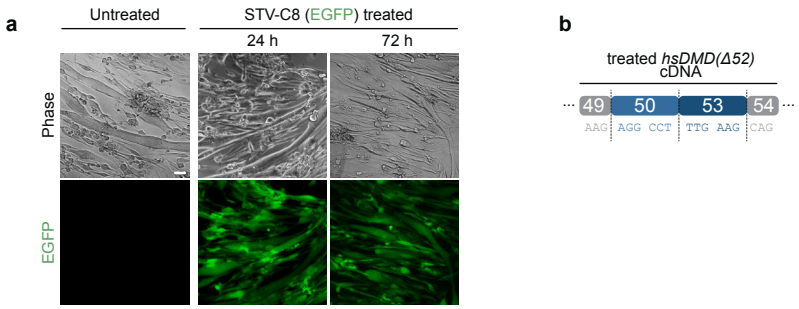


Supplementary Fig. 7 | Uncropped Agarose gels. a, Agarose gel corresponding to Figure 3h. **b,** Full-sized agarose gel of Figure 4e. **c,** Uncropped agarose gel of Extended Data Fig. 10h.



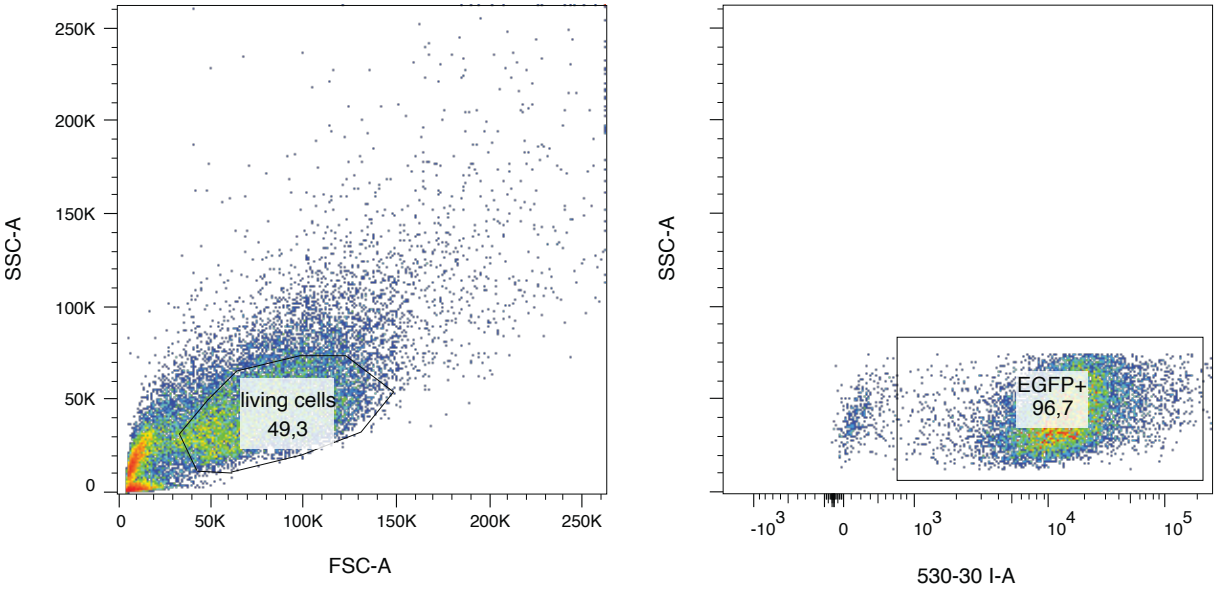
Supplementary Fig. 8 | Additional analysis of STV-C8 whole-body tissue distribution. a, Light-sheet imaging of cleared and signal-enhanced mouse body, treated with STV-C8(EGFP), 72 h post i.v. injection. **b,** Magnified upper and lower body parts of panel a (scale bar: 2 mm). **c,** Imaging of lung and liver tissues of an independently treated mouse, 24 h post i.v. injection (scale bar: 200 µm). EGFP is shown in green, tissue autofluorescence in grayscale.



Supplementary Fig. 9 | Extended analysis of STV-C8 treated myotubes. a, Live imaging of STV-C8(EGFP) treated myotubes (scale bar: 25 µm). **b,** Exon-exon junction analysis of cDNA derived from edited patient-derived myotubes by nanopore sequencing.

Exemplary gating strategy

Samples were first gated for living cells and subsequently for the fluorescence intensity, relevant for the experiment.



Supplementary Table 1 | Protein, RNA, and DNA sequences used in this study

Name	Description	Sequence
EGFR Receptor	EGFR Receptor for Minibinder Targeting Experiments	MRPSGTAGAALLALLAALCPASRALEEKKVCQGTSNKLTQLGTFEDHF LSLQRMFNNCEVVLGNLEITYVQRNYDLSFLKTIQEVAGYVLIALNTVE RIPLENLQIIRGNMYYENSYALAVLSNYDANKTGLKELPMRNLQEILHG AVRFSNNPALCNVESIQWRDIVSSDFLSNMSMDFQNHLGSCQKCDP SCPNGSCWGAGEENCQKLTKIICAQQCSGRCRGKSPSDCCHNQCAA GCTGPRESDCLVCRKFRDEATCKDTCPPLMLYNPTTYQMDVNPEGKY SFGATCVKKCPRNYVVTDHGSCVRACGADSYEMEEDGVRKCKKCEGP CRKVCNGIGIGEFKDSLSINATNIKHFKNCTSISGDLHILPVAFRGDSFTH TPPLDPQELDILKTVKEITGFLLIQAWPENRTDLHAFENLEIIRGRTKQH GQFSLAVVSLNITSLGLRSLKEISDGDVIISGNKNLCYANTINWKKLFGT SGQKTKIISNRGENSCKATGQVCHALCSPEGCWGPEPRDCVSCRNVS RGRECVDKCNLLEGEPREFVENSECIQCHPECLPQAMNITCTGRGPDN CIQCAHYIDGPHCVKTCPAGVMGENNTLVWKYADAGHVCHLCHPNC TYGCTGPGLEGCPTNGPKIPSIATGMVGALLLLLVVALGIGLFMRRRHI VRKRTLRRLLQERELVEPLTPSGEAPNQALLRILKETEFKKIKVLGSGAFG TVYKGLWIPEGEKVKIPVAIKELREATSPKANKEILDEAYVMASVDNPH VCRLLGICLTSTVQLITQLMPFGCLLDYVREHKDNIGSQYLLNWCVQIA KGMNYLEDRRLVHRDLAARNVLVKTPQHVKITDFGLAKLLGAEEKEYH AEGGKVPIKWMALESILHRIYTHQSDVWSYGVTVWELMTFGSKPYD GIPASEISSILEKGERLPQPPICTIDVYMIMVKCWMIDADSRPKFRELIIE FSKMARDPQRYLVIQGDERMHLPSPTDSNFYRALMDEEDMDDVVD ADEYLIPQQGFFSSPSTSRTPLLSSLSATSNNSTVACIDRNGLQSCPIKED SFLQRYSSDPTGALTEDSIDDTFLPVPEYINQSVPKRPAGSVQNPVYHN QPLNPAPSRDPHYQDPHSTAVGNPEYLNTVQPTCVNSTFDSPAHWA QKGSHQISLDNPDYQQDFFPKEAKPNGIFKGSTAENAEYLRVAPQSSE FIGA
IL7Ra Receptor	IL7Ra Receptor for Minibinder Targeting Experiments	MTILGTTFGMVFSLLQVVSGESGYAQNGDLEDAELDDYSFSCYSQLEV NGSQHSLTCAFEDPDVNITNLEFEICGALVEVKCLNFRKLQEIYFIETKKF LLIGKSNICVKVGEKSLTCKKIDLTTIVKPEAPFDLSVVYREGANDFVVTF NTSHLQKKYVKVLMHDVAYRQEKDENKWTHVNLSSTKLTLLQRKLQP AAMYEIKVRSIPDHYFKGFWSEWSPSYYFRTPEINNSSGEMDPILLTISI LSFFSVALLVILACVLWKKRIKPIVWPSLPDHKKTLEHLCKKPRKNLNVS FNPESFLDCQIHRVDDIQARDEVEGFLQDTFPQQLEESEKQRLGGDVQ SPNCPSEDVVITPESFGRDSSLTCLAGNVSACDAPILSSSRSLDCRESGK NGPHVYQDLLLSLGTTNSTLPPPFSLQSGILTLNPVAQGQPILTSLGSN QEEAYVTMSSFYQNQ
CD19 Receptor		MPPPRLLFFLLFLTPMEVRPEEPLVVKVEEGDNAVLQCLKGTSDGPTQ QLTWSRESPLKPFLKLSLGLPGLGIHMRPLAIWLFIFNVSQQMGGFYLC QPGPPSEKAWQPGWTVNVEGSGELFRWNVSDLGGLGCGLKNRSSE GPSSPSGKLMSPKLYVWAKDRPEIWEGEPPCLPPRDSLNQSLSQDLT MAPGSTLWLSCGVPPDSVSRGPLSWTHVHPKGPKSLLSLELKDDRPA RDMWVMETGLLLPRATAQDAGKYYCHRGNLTMSFHLEITARPVLW HWLLRTGGWKVSAVTLAYLIFCLCSLVGILHLQRALVLRRKRKRMTDP TRRFFKVTPPPGSGPQNQYGNVLSLPTPTSGLGRAQRWAAGLGGTAP SYGNPSSDVQADGALGSRSPPGVGPEEEEGEGYEEPDSEEDSEFYEND SNLGQDQLSQDGSGYENPEDEPLGPEDEDSFSNAESYENEDEELTQP VARTMDFLSPHGSAWDPSREATSLGSQSYEDMRGILYAAPQLRSIRG QPGPNHEEDADSYENMDNPDGPDPAWGGGGRMGTWSTR

EGFRn Minibinder	EGFRn Minibinder Sequence deisgned by Cao et al	DHWEEVFRWALEHLQEATQQNDPQKAKKILEEAHKWLRRELSEEEA RAVVRWLKQLVDRELS
EGFRc Minibinder	EGFRc Minibinder Sequence deisgned by Cao et al	SLDEAKKLLQEAEKLARKLNDRMELAYVEFLKHILETAKKQNDKRTIESV RDMARDALEELQS
IL7Ra Minibinder	IL7Ra Minibinder Sequence deisgned by Cao et al	SVIEKLRKLEKQARKQGDEVLVMLARMVLEYLEKGWVSEEDADESAD RIEEVLKK
CD19scFv	Light chain $(GGGGS)_3$ Heavy chain	DIQMTQTTSSLSASLGDRVTISCRASQDISKYLNWYQQKPDGTVKLLIY HTSRLHSGVPSRFSGSGSGTDYSLTISNLEQEDIATYFCQQGNTLPYTF GGGTKLEITGGGGSGGGGSGGGGSEVKLQESGPGLVAPSQSLSVTCT VSGVSLPDYGVSWIRQPPRKGLEWLGVIWGSETTYYNSALKSRLTIIKD NSKSQVFLKMNSLQTDDTAIYYCAKHYYYGGSYAMDYWGQGTSVTV SS
EGFRn-STV-Presentation	EGFRn Minibinder Presentation (SP, export signals, etc.) - **Minibinder Sequence**	MGVKVLFALICIAVAEAKGSGKPIPNPLLGLDSTPGWEAALAEALAEAL AEHLAEALAEALEALAAGPGSEPATSGSETPGTSESATPESGPGGSG**D HWEEVFRWALEHLQEATQQNDPQKAKKILEEAHKWLRRELSEEEAR AVVRWLKQLVDRELS**TGGPGSEPATSGSETPGTSESATPESGPGSGA HHFSEPEITLIIFGVMALVIGTILLISYGIRRLIKKSPSGGGTGFCYENEVG SGRSRFVKKDGHCNVQFINVGSGKSRITSEGEYIPLDQIDINVGGSGGD YKDDDDK
EGFRc-STV-Presentation	EGFRc Minibinder Presentation (SP, export signals, etc.) - **Minibinder Sequence**	MGVKVLFALICIAVAEAKGSGKPIPNPLLGLDSTPGWEAALAEALAEAL AEHLAEALAEALEALAAGPGSEPATSGSETPGTSESATPESGPGGSG**SL DEAKKLLQEAEKLARKLNDRMELAYVEFLKHILETAKKQNDKRTIESV RDMARDALEELQS**TGGPGSEPATSGSETPGTSESATPESGPGSGAHH FSEPEITLIIFGVMALVIGTILLISYGIRRLIKKSPSGGGTGFCYENEVGSGR SRFVKKDGHCNVQFINVGSGKSRITSEGEYIPLDQIDINVGGSGGDYKD DDDK
IL7Ra-STV-Presentation	IL7Ra Minibinder Presentation (SP, export signals, etc.) - **Minibinder Sequence**	MGVKVLFALICIAVAEAKGSGKPIPNPLLGLDSTPGWEAALAEALAEAL AEHLAEALAEALEALAAGPGSEPATSGSETPGTSESATPESGPGGSG**SV IEKLRKLEKQARKQGDEVLVMLARMVLEYLEKGWVSEEDADESADR IEEVLKK**TGGPGSEPATSGSETPGTSESATPESGPGSGAHHFSEPEITLII FGVMALVIGTILLISYGIRRLIKKSPSGGGTGFCYENEVGSGRSRFVKKD GHCNVQFINVGSGKSRITSEGEYIPLDQIDINVGGSGGDYKDDDDK
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	sequence	AELEKALL
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HE0517	cage screen/cage sequence	ERRERARLMMELLAEIAEEAAILQLAAQLAVLMYLSSLVGEDPEELLEIF EEIVLARVQTEFQREVAERVLERLREFVEK
HE0521	cage screen/cage sequence	AEEVLALVAARVMRQLAEDALLAAELGLEEVAAALVELMKALAEEVAK RVSPEVAERVKRVLALLLTRLEKEIAEAKAAE
HE0537	cage screen/cage sequence	SSFQEEAEKTFENLLELLLIATNLDTRVASELAEALVYIMGLLEENKEEFF EKFLKLSKYLNNVTLARAIKTAIELGDKEFTEKLLKEFNKIIEEKKKLV
HE0620	cage screen/cage sequence	KKIVIEAEMIPENHETILAVVKELVEEGVENLEIVLKVTPETTKEQSVELV KKIIEILK
HE0621	cage screen/cage sequence	AAAEIIKLNLTITENAKFQLLQDYAKFLGDKEELKKITEEANKWFEERMK ELEERIKKLE
HE0625	cage screen/cage sequence	VKRKFTLKLTTGASDDMTEVVPEFLAMIKEAAELFDEVTIKVTTESPEM ARAVMEGVGILIKEGVDVTLEIELGSNVKARVEVLKTLAEELKKIKEEIE
HE0626	cage screen/cage sequence	IKRHFTLKLTTGASDDMKEVVPEFLAMIKEAAELFDEVTLKLTTENPEM ARALMEGVGILIKEGVDVHLEVELGSNVKARVEVLKTLAEELKKIKEEIE
HE0633	cage screen/cage sequence	ATTTTTTVTLDSASGERTLTTTTTVPAGTTLAEMVALAEAQLAAASEFD RRTATVTVTEE
HE0639	cage screen/cage sequence	SKAEELAKEMIELLRLVKELLLETTPEFPETTLIALAIVLNAVVTTLNALLD KVPLELLKELVEVMKDTVEGLKEKLKAL
HE0644	cage screen/cage sequence	VSISLSGKTSEELKVMAKLAEYLGEEKTAEILKKLIPEVKELEAKGETSLEV SVTITFE
HE0649	cage screen/cage sequence	KKSVTIRVTADAAVLAEFTALLLEWLDLDAREVLEAFRKWLEEMKARGI KDDYTVELTVE
HE0657	cage screen/cage sequence	EELIKELKEKQKETQAELEKEYKEYKEKGESESAAIMKATSTQVATKYEIE IAKLKLELL
HE0662	cage screen/cage sequence	EAILEAIRRLCEAGIKVTVVLAGPISLMEAIVETCIEVGVDEVVIDTSKDH LELIEADK
HE0690	cage screen/cage sequence	LKVKIKVKDNPAVARGVLRLADKLKKAGVDVEIEIDLYGDEEQALATLA AMEAEVEELA
HE0897	cage screen/cage sequence	SAEALKLARLAALVGLVGAAVATADPANPLFLELLKNPDPFVLQEALTA ALVAAILTGEAARCNALALGLAARLSREDAARAALRAAELAYETAALLA SL
HE0898	cage screen/cage sequence	SFTEEELEKLKEAVKLAVEALLLTPKDFEKALKLLEEVTLKVVEILRRDPLE ALKAAFKSTTAIAKLYVAHASKDVSEAQAIAAEAVKALLDLYEKALKE
HE0899	cage screen/cage sequence	SFTEEELEELKKAVKLAVEALLLTPDDFEKALKLLEEVTLRVVEILKRDPLE ALKAAFYFNTQIAKLYVAHASGDVSEAQKEMAKFVKYLLDLYEKALEE
HE0900	cage screen/cage sequence	AFTEEQLKALQESLKLVIEAAELMPDDFEKAIELVEEVARRLVEIFASDPL AALHLAFKFNTAIAKAIVANASKGKEEAMKVLVELAKYVFDLLVAALEA

HE0902	cage screen/cage sequence	FTEEEIKKIRESLKLSVEALEVTPKDFEKALELLEEVAINLMEIFKDDPMK ALKIAFKFTNAIAKLYVAHESKDVADAMAIMAEVTKYILEILEKVLEE
HE0908	cage screen/cage sequence	ELAEKERLARINIGAVLAGLAMAVVGACKELAEAGMVMAIMSVVAVE LAQDPEAAVELAERCIEMAGGLSEEVKKMIKAAVRALKGVVEAEEAKI KKFKA
HE0915	cage screen/cage sequence	EEELLEEILEFFEKLSDPKALVAFMLEKAPPDPGLKTALRIALSGPNITVG KALTLGKAIAEVSAGRYGGAGMIAGAAGGFEIGDEEVKRECKLALLKYL
HE0916	cage screen/cage sequence	SKEVEEALLKALAAALIAAVAANKAAAVEVLRAIAEEGLDVLVAVVREA MRALADSPLVATLREAAREVAAELPPEERARFLAALEAAAAEVEAEAA RAR
HE0917	cage screen/cage sequence	SAEVEQALLEALAAALIGAVAASREAAKAVLRAIAELGLDVALAVVRRA LRALAESPLVEVLLEAAREVAEELPPEERARFLAALARAAAEVEEEERER R
HE0918	cage screen/cage sequence	EEAVKKALIEALAAALIAAVAASKEAAKAVLKAIAELGLDVAVEVVEKAL RALADSPLVAVLIEAAKEVAEELPPEERARFLAALAEAVARVEAEAKEA A
HE0919	cage screen/cage sequence	EAVQQALLEALAAALIAAAAASAAAAKAVLRAIAELGLDVLVEVVRRAL RALADSPLVATLLAAAREVAAELPPEERAEFLAALERAAAEVEEEAARA K
HE0920	cage screen/cage sequence	SEEVRQALLEALAAALIAAAAASREAAVAVLRYLVELGLEVALEVVRLAL RALRGSPLRERLLAAAEEVAAELPGEEAARFRAALARAAAEVAEEAARE E
HE0930	cage screen/cage sequence	VKELVAELAELAGEADAELRAQIALLLAVIALAPEEQKEELAELALRVVR EALEAAASPAVPVALAAAAAAFARSEDPEAVRREAEAIITGLRLAKEGL A
HE0935	cage screen/cage sequence	KELLAEIAELAGEADAELRAQAALLLAVIALAPEEDKEFYAELALRVLRA GLEAAASPAVPVALAKAAAALARGEDREAVERTIEAILTGLELTKKGLA
no cage	cage screen/cage sequence	GGS
F5GXC1	MBD screen/MBD sequence	LRGSRLRKIRSRTWHKERLYRLQEDGLSVWFQRRIPRAPSQHIFFVQHI EAVREGHQSEGLRRFGGAFAPARCLTIAFKGRRKNLDLAAPTAEEAQR WVRGLTKLR
Q9BRC7	MBD screen/MBD sequence	LTTDQDLLLMQEGMPMRKVRSKSWKKLRYFRLQNDGMTVWHARQ ARGSAKPSFSISDVETIRNGHDSELLRSLAEELPLEQGFTIVFHGRRSNL DLMANSVEEAQIWMRGLQLLV
O75038	MBD screen/MBD sequence	CMGAMQEGMQMVKLRGGSKGLVRFYYLDEHRSCIRWRPSRKNEKA KISIDSIQEVSEGRQSEVFQRYPDGSFDPNCCFSIYHGSHRESLDLVSTSS EVARTWVTGLRYLM
Q15111	MBD screen/MBD sequence	SANDCISFMQAGCELKKVRPNSRIYNRFFTLDTDLQALRWEPSKKDLE KAKLDISAIKEIRLGKNTETFRNNGLADQICEDCAFSILHGENYESLDLVA NSADVANIWVSGLRYLV
Q96BJ8	MBD screen/MBD sequence	RLLRLCEGTLFRKISSRRRQDKLWFCCLSPNHKLLQYGDMEEGASPPTL ESLPEQLPVADMRALLTGKDCPHVREKGSGKQNKDLYELAFSISYDRG EEEAYLNFIAPSKREFYLWTDGLSALL
Q96JJ3	MBD screen/MBD sequence	RLNRLCEGSSFRKIGNRRRQERFWYCRLALNHKVLHYGDLDDNPQGE VTFESLQEKIPVADIKAIVTGKDCPHMKEKSALKQNKEVLELAFSILYDP DETLNFIAPNKYEYCIWIDGLSALL
B4DN84	MBD screen/MBD sequence	ASLLQDLSISDVETIRNGHDSELLRSLAEELPLEQGFTIVFHGRRSNLDL MANSVEEAQIWMRGLQLLV
Q9HB19	MBD	LIKSGYCVKQGNVRKSWKRRFFALDDFTICYFKCEQDREPLRTIFLKDVL

	screen/MBD sequence	KTHECLVKSGDLLMRDNLFEIITSSRTFYVQADSPEDMHSWIKEIGAAV
Q9HB21	MBD screen/MBD sequence	KPPQDSAVIKAGYCVKQGAVMKNWKRRYFQLDENTIGYFKSELEKEPL RVIPLKEVHKVQECKQSDIMMRDNLFEIVTTSRTFYVQADSPEEMHS WIKAVSGAI
Q9Y4G2	MBD screen/MBD sequence	EPDAIKESLLYLYMDRTWMPYIFSLSLEALKCFRIRNNEKMLSDSHGVE TIRDILPDTSLGGPSFFKIITAKAVLKLQAGNAEEAALWRDLVRKVL
A0A2U3YBU1	MBD screen/MBD sequence	GLQDDEDLQALLKGSQLLKVKSNSWRRERFYKLQEDCKTIWQESRKV MRTPESQLFSIEDIQEVRKGHRTEGMEKFARDVPEDRCFSIVFKDQRN TLDLIAPSPAEAQHWVQGLRKIIH
A0A061I7U7	MBD screen/MBD sequence	GLQDDQDLQALLKGSQLLKVKSSSWRRERFYKLQEDCKTIWQESRKV MRSPESQLFSIEDIQEVRMGHRTEGLEKFARDIPEDRCFSIVFKDQRNT LDLIAPSSADAQHWVQGLRKIIH
A0A7N9CX73	MBD screen/MBD sequence	DDEDLQALLKGSQLLKVKSSSWRRERFYKLQEDCKTIWQESRKVMRT PESQLFSIEDIQEVRMGHRTEGLEKFARDVPEDRCFSIVFKDQRNTLDLI APSPADAQHWVLGLRKIIH
A0A480MS63	MBD screen/MBD sequence	GLQDDKDLQALLKGGQLLKVKSNSWRRERFYKLQEDCKTIWQESRKV MRTPESQLFSIEDIQEVRMGHRTEGLEKFARDVPEDRCFSIVFKDQRN TLDLIAPSPADAQHWVLGLRKIIH
A0A452QKQ4	MBD screen/MBD sequence	GLQDDEDLQVLLKGSQLLKVKSNSWRRERFYKLQEDCKTIWQESRKV MRTPESHLFSIEDIQEVRKGHRTEGMEKFARDVPEDRCFSIVFKDQRN TLDLISPSPAEAQHWVRGLHKIIH
A0A1S3GCG9	MBD screen/MBD sequence	GLQDDRDLQALLKGGQLLKVKSGSWRRERFYKLQEDCKTIWQESRKV MRTPESQLFSIEDIQEVRMGHRTEGLEKFARDIPDDRCFSIVFKDQRST LDLIAPSPADAQHWVQGLRKVIH
A0A6P5IN86	MBD screen/MBD sequence	GPADDGDLKFLLKGSQLLKVKSSSWRKDRFYKLQEDCKTIWQESKKM MRSPESQLFSIEDIQEVRRGHQTEGMEKFARDAPEHRCFSIIFKDQRS NLDLIAGSEVEAQHWVDGLRKII
A0A2I0TQP5	MBD screen/MBD sequence	GLKDDKDLKFLLKGSQLLKVKSGSWRKERFYKLQEDCKTIWQESKKML RSPESQIFSIEDIRDVRSGHKTEGMEKYAKDVPEYRCFSIIFKDQRKTLDL IASSEDDANHWISGLGKII
A0A093CX92	MBD screen/MBD sequence	KDDKDLKFLLKGSQLLKVKSGSWRKERFYKLQEDCKTIWQESKKMLRS PESQIFSIEDIRDVRSGHKTEGMEKYAKDVPEYRCFSIIFKDQRKNLDLIA SSEDDANHWISGLGKII
A0A6P5IML8	MBD screen/MBD sequence	GPADDGDLKFLLKGSQLLKVKSSSWRKDRFYKLQEDCKTIWQESKKM MRSPESQLFSIEDIQEVRRGHQTEGMEKFARDAPEHRCFSIIFKDQRS NLDLIAGSEVEAQHWVDGLRKII
MGYP002377957044	MBD screen/MBD sequence	QEGSDFLKVRSYARQFRRLYKLNESLTMISWYPTSKKPSKATSRNVLRR KKNEIISICLFFRLVPIDSIKEVRLGKTTERLREYAQQYENETLFSIIYTNGS NEYDSLDLVASTADEANIWVTGLSCLI
MGYP001103578616	MBD screen/MBD sequence	FMKKGTPFLKYGHYGYPHFRQFQLSEDNARIQWYSQAKSLKDTTISIY DIDEIRLGQTTAIFAKHRAPELSKSSFSVIYTGGKTLDVIAKDPNEYRLW TEGLRRLV
MGYP002782181533	MBD screen/MBD sequence	GSDFLKVRSYARQFRRFYRLNETLTSISWYPTSKKAAKAMSKNASSNRE MEMIYLSTSVLIDSIKEVRLGKTSERLRECTHQFQNESLFSIIYSNGTHDN VSLDLVTSSPDEANIWVTGLSCLI
MGYP002169641634	MBD screen/MBD sequence	INLVTEMQTGSVMLKCAKHGKPHFSLFQLSSDAEMLQWTSRKKAPAE TQLRIDHIRELLLGQQTPVFARCSLPQFEGLSFSVITPERSLDIVCTTAAE LRTWTRGLEAL
MGYP003572965	MBD	PVAETLTELKGGHRLIKCRGSKSKYTRHFRITEDLIAMVYTDSHKPDCVA

178	screen/MBD sequence	GKDDMSNVYITEIHEIRDTPSSDVFKKQLPSLSGKEQQCFSLVVGERHK TLDLVAPSPKVKDSWVIGLNHLK
MGYP001233249524	MBD screen/MBD sequence	YDGTMLLKFGRKGQAHERLFRLSQDNRYISWKSSIFTFKSAEDCRVDLE AVSRIQHGQMTANFERHKAHFGRAESNSFSIIYNGDRTLDLIAPSYDIF EIWFHGLKYLL
MGYP003385211623	MBD screen/MBD sequence	TIEFMIRGENVNKLPHQIHKKKITKKPQQRFLRLTSDLKNIFWRSSTANS VFSSATRSKATERGIYIRDVLDVQVGQTTETFRLQQMEMPVASSFSLIT AERSVDIVCESSYHRDLWVAGMRLLM
MGYP003537806627	MBD screen/MBD sequence	AQKYLPMLYQGERFLKYGNYTTPHERFFKLSPDHKKITWSTISGCRTFH RNKCIFIDSIKDIYIGVDSSRVFQQFRIPVDYDQNCFSIVTTSRSLDLRNE NEAISMKWFSAIKYLI
MGYP001097820974	MBD screen/MBD sequence	TIGQLERGTVVTKFYSKKKPEKKMLAVRRETMLVVWHRALSGRNMFE GAVDIRDIKEIRLGKLSRDFEKWSDDCQNIKQGRCFVVYYGREFNLKTL SVVALAESECDLWIRGLRFLV
MGYP003957870823	MBD screen/MBD sequence	NLLKQGAIFRKHNLHGKPVERFITLSQDLQYLQWFPVEDHTKMSGKV SVSDIFGVRTGLSSAALKRSGLTGAKIKLCFTVYCSNDVLLSLEAASPEQ CEEWVSSLRYLIS
noMBD	MBD screen/MBD sequence	G
noBudding	no budding domain	TG
SynL	budding domain	PTAPPGSGSPTAPPEYSGSGPSAPPMEEKLLDLGGSGPYKEGSGSPPP PYVGSGLYPSLSGGFPIVSGGPLPPVGSGSYLDL
LS4	Alternative RNA binding protein	YVRFEVPEDMQNEALSLLEKVRESGKVKKGTNRTTHAVYRGLAKLVYI AEDVDPPEIVAHLPLLCEEKNVPYIYVKSKNDLGRAVGGWPIGASAAII NEGELRKELGSLVEKIKGLQKRSHMHLE
PCP	Alternative RNA binding protein	SKTIVLSVGEATRTLTEIQSTADRQIFEEKVGPLVGRLRLTASLRQNGAK TAYRVNLKLDQADVVDSGLPKVRYTQVWSHDVTIVANSTEASRKSLY DLTKSLVATSQVEDLVVNLVPLGR
tdPCP	Mainly used RNA binding protein	SKTIVLSVGEATRTLTEIQSTADRQIFEEKVGPLVGRLRLTASLRQNGAK TAYRVNLKLDQADVVDSGLPKVRYTQVWSHDVTIVANSTEASRKSLY DLTKSLVATSQVEDLVVNLVPLGRGGSGGSKTIVLSVGEATRTLTEIQST ADRQIFEEKVGPLVGRLRLTASLRQNGAKTAYRVNLKLDQADVVDSGL PKVRYTQVWSHDVTIVANSTEASRKSLYDLTKSLVATSQVEDLVVNLV PLGR
final STV construct	MBD:A0A452QKQ4/budding domain:SynL/spacer:PCR XTEN-HiBiT-HA/RNA binding:tdPCP/assembly:HE0690	MGLQDDEDLQVLLKGSQLLKVKSNSWRRERFYKLQEDCKTIWQESRK VMRTPESHLFSIEDIQEVRKGHRTEGMEKFARDVPEDRCFSIVFKDQR NTLDLISPSPAEAQHWVRGLHKIIHTGPTAPPGSGSPTAPPEYSGSGPS APPMEEKLLDLGGSGPYKEGSGSPPPPYVGSGLYPSLSGGFPIVSGGPL PPVGSGSYLDLGPGSEPATSGSETPGTSESATPESGPGGSGGVSGWRL FKKISGGSGSKTIVLSVGEATRTLTEIQSTADRQIFEEKVGPLVGRLRLTA SLRQNGAKTAYRVNLKLDQADVVDSGLPKVRYTQVWSHDVTIVANST EASRKSLYDLTKSLVATSQVEDLVVNLVPLGRGGSGGSKTIVLSVGEAT RTLTEIQSTADRQIFEEKVGPLVGRLRLTASLRQNGAKTAYRVNLKLDQ ADVVDSGLPKVRYTQVWSHDVTIVANSTEASRKSLYDLTKSLVATSQV EDLVVNLVPLGRGTGGYPYDVPDYAGGLKVKIKVKDNPAVARGVLRL ADKLKKAGVDVEIEIDLYGDEEQALATLAAMEAEVEELA*

first STV construct	MBD:PHPLC/budding domain:SynL/spacer:PCR XTEN-HiBiT-HA/RNA binding:tdPCP/assembly:HE0902	MHGLQDDPDLQALLKGSQLLKVKSSSWRRERFYKLQEDCKTIWQESR KVMRSPESQLFSIEDIQEVRMGHRTEGLEKFARDIPEDRCFSIVFKDQR NTLDLIAPSPADAQHWVQGLRKIIHHSGSMDQRQKLQTGPTAPPGS GSPTAPPEYSGSGPSAPPMEEKLLDLGGSGPYKEGSGSPPPPYVGSGL YPSLSGGFPIVSGGPLPPVGSGSYLDLGPGSEPATSGSETPGTSESATPE SGPGGSGGVSGWRLFKKISGGSGSKTIVLSVGEATRTLTEIQSTADRQI FEEKVGPLVGRLRLTASLRQNGAKTAYRVNLKLDQADVVDSGLPKVRY TQVWSHDVTIVANSTEASRKSLYDLTKSLVATSQVEDLVVNLVPLGRG GSGGSKTIVLSVGEATRTLTEIQSTADRQIFEEKVGPLVGRLRLTASLRQ NGAKTAYRVNLKLDQADVVDSGLPKVRYTQVWSHDVTIVANSTEASR KSLYDLTKSLVATSQVEDLVVNLVPLGRGTGGYPYDVPDYAGGFTEEEI KKIRESLKLSVEALEVTPKDFEKALELLEEVAINLMEIFKDDPMKALKIAF KFTNAIAKLYVAHESKDVADAMAIMAEVTKYILEILEKVLEE*
PHPLC	MBD	MHGLQDDPDLQALLKGSQLLKVKSSSWRRERFYKLQEDCKTIWQESR KVMRSPESQLFSIEDIQEVRMGHRTEGLEKFARDIPEDRCFSIVFKDQR NTLDLIAPSPADAQHWVQGLRKIIHHSGSMDQRQKLQ
N Split Luc	Cargo	MEDAKNIKKGPAPRYPLEDGTAGEQLHKAMKRYAQVPGTIAFTDAHI EVNITYAEYFEMSVRLAEAMKRYGLNTNHRIVVCSENSLQFFMPVLGA LFIGVAVAPANDIYNERELLNSMNISQPTVVFVSKKGLQKILNVQKKLPI IQKIIIMDSKTDYQGFQSMYTFVTSHLPPGFNEYDFKPESFDRDKTIALI MNSSGSTGLPKGVALPHRTACVRFSHARDPIFGNQIKPDTAILSVVPF HHGFGMFTTLGYLICGFRVVLMYRFEEELFLRSLQDYKIQSALLVPTLFS FFAKSTLIDKYDLSNLHEIASGGAPLSKEVGEAVAKRFHLPGIRQGYGLT ETTSAILITPEGDDKPGAVGKVVPFFEAKVVDLDTGKTLGVNQRGELCV RGPMIMCLDLKTQVQTPQGMKEISNIQVGDLVLSNTGYNEVLNVFPK SKKKSYKITLEDGKEIICSEEHLFPTQTGEMNISGGLKEGMCLYVKEGPG SEPATSGSETPGTSESATPESGPGTGEIAALEAKIAALKAKNAALKAEIA ALEAGSGNSHGFPPEVEEQAAGTLPMSCAQESGMDRHPAACASARI NV
C Split Luc	incl Intein etc, LgBit (S64)	KIAALKAEIAALEAENAALEAKIAALKAGPGSEPATSGSETPGTSESATP ESGPGMMLKKILKIEELDERELIDIEVSGNHLFYANDILTHNSGYVNNPE ATNALIDKDGWLHSGDIAYWDEDEHFFIVDRLKSLIKYKGYQVAPAEL ESILLQHPNIRDAGVAGLPDDDAGELPAAVVVLEHGKTMTEKEIVDYV ASQVTTAKKLRGGVVFVDEVPKGLTGKLDARKIREILIKAKKGGKIAV
N Split Luc-PP7	incl PP7	AUGGAAGAUGCCAAGAACAUCAAGAAGGGCCCUGCUCCUAGAU ACCCUCUGGAAGAUGGAACCGCUGGCGAGCAGCUGCACAAGGCC AUGAAGAGAUACGCUCAGGUGCCCGGCACAAUCGCCUUCACAGA UGCCCACAUCGAAGUGAACAUCACCUACGCCGAGUACUUCGAGA UGAGCGUGCGGCUGGCCGAAGCUAUGAAGCGAUACGGCCUGAA CACCAACCACAGAAUCGUCGUGUGCAGCGAGAACAGCCUCCAGU UCUUCAUGCCUGUGCUGGGCGCUCUGUUCAUCGGAGUGGCUG UGGCUCCUGCCAACGACAUCUACAACGAGCGCGAGCUGCUGAAC AGCAUGAACAUCAGCCAGCCUACCGUGGUGUUCGUGUCCAAGA AGGGACUGCAAAAGAUCCUGAACGUGCAGAAGAAGCUGCCCAU CAUCCAGAAAAUCAUCAUCAUGGACAGCAAGACCGACUACCAGG GCUUCCAGAGCAUGUAUACCUUCGUGACCAGCCAUCUGCCACCA GGCUUCAACGAGUACGACUUCAAGCCCGAGAGCUUCGACAGAG ACAAGACAAUCGCCCUGAUCAUGAACAGCAGCGGCUCUACCGGA CUGCCUAAAGGCGUUGCCCUGCCUCACAGAACAGCUUGCGUCAG AUUCAGCCACGCCAGAGAUCCCAUCUUCGGCAACCAGAUCAAGC CUGACACCGCUAUCCUGAGCGUGGUGCCUUUUCACCACGGCUU CGGCAUGUUCACCACACUGGGCUACCUGAUCUGCGGCUUCAGA

		GUGGUGCUGAUGUAUCGCUUUGAGGAAGAACUGUUCCUGCGG AGCCUCCAGGACUACAAGAUCCAGUCUGCUCUGCUGGUGCCUAC UCUGUUCAGCUUCUUUGCCAAGAGCACCCUGAUCGAUAAGUAC GACCUGAGCAACCUGCACGAGAUCGCCUCUGGCGGAGCCCCUCU GUCUAAAGAAGUGGGCGAAGCCGUCGCCAAGAGAUUUCAUCUG CCCGGCAUCAGACAAGGCUACGGACUGACCGAGACAACCAGCGC CAUCCUGAUCACACCUGAGGGCGACGAUAAGCCUGGCGCUGUG GGAAAAGUGGUGCCAUUCUUCGAGGCUAAGGUGGUGGACCUG GACACCGGCAAAACACUGGGAGUGAAUCAGAGGGGCGAGCUGU GUGUCAGAGGCCCUAUGAUCAUGUGCCUGGACCUUAAGACCCA GGUGCAGACCCCCCAGGGCAUGAAGGAAAUCAGCAACAUCCAAG UGGGCGACCUGGUGCUGAGCAACACCGGCUACAACGAGGUGCU GAACGUGUUCCCCAAGAGCAAGAAGAAGUCCUACAAGAUCACCC UGGAAGAUGGCAAAGAGAUCAUCUGCUCCGAGGAACACCUGUU CCCAACCCAGACCGGCGAGAUGAACAUCUCUGGCGGCCUGAAAG AGGGCAUGUGCCUGUACGUGAAAGAAGGUCCCGGCUCUGAGCC UGCUACCAGUGGGUCCGAAACCCCUGGCACCUCCGAGUCUGCCA CCCCAGAGUCCGGCCCUGGGACCGGUGAGAUCGCGGCCCUCGAG GCUAAAAUCGCUGCCCUCAAAGCGAAGAACGCCGCUCUCAAGGC AGAGAUCGCGGCACUGGAAGCAGGCAGCGGAAACAGCCACGGC UUCCCACCCGAGGUGGAAGAACAGGCUGCCGGAACCCUGCCUAU GAGCUGCGCUCAGGAAUCCGGCAUGGACAGGCACCCUGCCGCU UGUGCCUCCGCCAGAAUCAACGUGUGAACGCGUGAAUUCCGAC CAGAAGAUAUGGCUUCGGUUGGGUUCAAA
EGFP-PP7	incl PP7	AUGGUGAGCAAGGGCGAGGAGCUGUUCACCGGGGUGGUGCCCA UCCUGGUCGAGCUGGACGGCGACGUAAACGGCCACAAGUUCAG CGUGUCCGGCGAGGGCGAGGGCGAUGCCACCUACGGCAAGCUG ACCCUGAAGUUCAUCUGCACCACCGGCAAGCUGCCCGUGCCCUG GCCCACCCUCGUGACCACCCUGACCUACGGCGUGCAGUGCUUCA GCCGCUACCCCGACCACAUGAAGCAGCACGACUUCUUCAAGUCC GCCAUGCCCGAAGGCUACGUCCAGGAGCGCACCAUCUUCUUCAA GGACGACGGCAACUACAAGACCCGCGCCGAGGUGAAGUUCGAG GGCGACACCCUGGUGAACCGCAUCGAGCUGAAGGGCAUCGACU UCAAGGAGGACGGCAACAUCCUGGGGCACAAGCUGGAGUACAA CUACAACAGCCACAACGUCUAUAUCAUGGCCGACAAGCAGAAGA ACGGCAUCAAGGUGAACUUCAAGAUCCGCCACAACAUCGAGGAC GGCAGCGUGCAGCUCGCCGACCACUACCAGCAGAACACCCCCAUC GGCGACGGCCCCGUGCUGCUGCCCGACAACCACUACCUGAGCAC CCAGUCCGCCCUGAGCAAAGACCCCAACGAGAAGCGCGAUCACA UGGUCCUGCUGGAGUUCGUGACCGCCGCCGGGAUCACUCUCGG CAUGGACGAGCUGUACAAGACCGGUUGAACGCGUGAAUUCCGA CCAGAAGAUAUGGCUUCGGUUGGGUUCAAA
SEND Cargo GFP	incl Peg10	GGAUUUGGCGCCCCCCCUCCUAGGAUCUCUCUAUAUAAGGCAA GCAGUCCGGACUCCCGAUACACGCGUUUCCAACUUGAGUUGGU GUGUGUCGAAGAAUCCUGACCAACUACGACCUGGGGAGAGCAG CCAACCGAGAAGGUCCACCGAGCCUCGCCUAGGUCUGCUGCGCG GGCUGCGGUCCGGAGCCUUCUCCGGACCGCGGUCACCCAGUGG ACCGGGCCGUCGCGGGACCCCUCAUCCUUCGUGGCAUCGCAGAG GAAUCCUCGUGUGGAACAGGCGGGUUUUAAGAACCAAAAGACG CCAACCACGAGGGUCCCAGGAUCCAGGGCUCCCUCCCCAGGGGA GUGAAGCCCCUCUCACCGCAGCCAUGGUGAGCAAGGGCGAGGA GCUGUUCACCGGGGUGGUGCCCAUCCUGGUCGAGCUGGACGGC

		GACGUAAACGGCCACAAGUUCAGCGUGUCCGGCGAGGGCGAGG GCGAUGCCACCUACGGCAAGCUGACCCUGAAGUUCAUCUGCACC ACCGGCAAGCUGCCCGUGCCCUGGCCCACCCUCGUGACCACCCU GACCUACGGCGUGCAGUGCUUCAGCCGCUACCCCGACCACAUGA AGCAGCACGACUUCUUCAAGUCCGCCAUGCCCGAAGGCUACGUC CAGGAGCGCACCAUCUUCUUCAAGGACGACGGCAACUACAAGAC CCGCGCCGAGGUGAAGUUCGAGGGCGACACCCUGGUGAACCGC AUCGAGCUGAAGGGCAUCGACUUCAAGGAGGACGGCAACAUCC UGGGGCACAAGCUGGAGUACAACUACAACAGCCACAACGUCUAU AUCAUGGCCGACAAGCAGAAGAACGGCAUCAAGGUGAACUUCA AGAUCCGCCACAACAUCGAGGACGGCAGCGUGCAGCUCGCCGAC CACUACCAGCAGAACACCCCCAUCGGCGACGGCCCCGUGCUGCU GCCCGACAACCACUACCUGAGCACCCAGUCCGCCCUGAGCAAAGA CCCCAACGAGAAGCGCGAUCACAUGGUCCUGCUGGAGUUCGUG ACCGCCGCCGGGAUCACUCUCGGCAUGGACGAGCUGUACAAGU AACAUCCUGCAGUGCUGCGUGAAACCUGUCAUGUCCUUUGUAG UCUCUGCCCUCAACUUGAUCCUGUGCAGCUUCUCAAUCUAUGA CUGUGUGGUACUGGACCUUCAGAGGCGCACAGAGCUCAAGUCA GUUUUCGUCUUGACUGCCACUUUAUAAGUUGACAGGCCUGGG UUUUACUUGUUAAAACCUCUCACCAUCUCAAUCACAGGCUGCCA AGUGUCUUUACAAAGAAGCUGAUACAAACACAGGCCAUGCUGA UUUCUUACAGAGGGAGAGAAGAGGAAGAGAAGAAGAAAGAGG AGGAAGAGGACAUGACUUGCCCAUAUGCUGGGCACCUUAUAAA GGAAGCCAGACUUUUCGGUGCAGUAUGGAAAGGCUUCCGUGA UUCUCUUGCUGCACCCCACGAAACUUCACCACCUUCAAACUCCA UUUUCACGGUUCCGUUAAUUUUCAAGGAGCAGCAACUCGACUG GUUCUCUGCUACAUGAAACACCUCAGCUUGAAAAGGAAGUGCU CUCUCAGACUGACUUGUGAGUGUGCCUUCACAUUCUGGUGCAA AUCAUG
VLP		MGARASVLSGGELDRWEKIRLRPGGKKKYKLKHIVWASRELERFAVN PGLLETSEGCRQILGQLQPSLQTGSEELRSLYNTVATLYCVHQRIEIKDT KEALDKIEEEQNKSKKKAQQAAADTGHSNQVSQNYPIVQNIQGQMV HQAISPRTLNAWVKVVEEKAFSPEVIPMFSALSEGATPQDLNTMLNT VGGHQAAMQMLKETINEEAAEWDRVHPVHAGPIAPGQMREPRGS DIAGTTSTLQEQIGWMTNNPPIPVGEIYKRWIILGLNKIVRMYSPTSILD IRQGPKEPFRDYVDRFYKTLRAEQASQEVKNWMTETLLVQNANPDCK TILKALGPAATLEEMMTACQGVGGPGHKARVLAEAMSQVTNSATIM MQRGNFRNQRKIVKCFNCGKEGHTARNCRAPRKKGCWKCGKEGHQ MKDCTERQANFLGKIWPSYKGRPGNFLQSRPEPTAPPEESFRSGVETT TPPQKQEPIDKELYPLTSLRSLFGNDPSSQASNFTQFVLVDNGGTGDV TVAPSNFANGVAEWISSNSRSQAYKVTCSVRQSSAQKRKYTIKVEVPK VATQTVGGVELPVAAWRSYLNMELTIPIFATNSDCELIVKAMQGLLKD GNPIPSAIAANSGIY
EPN		MHGLQDDPDLQALLKGSQLLKVKSSSWRRERFYKLQEDCKTIWQESR KVMRSPESQLFSIEDIQEVRMGHRTEGLEKFARDIPEDRCFSIVFKDQR NTLDLIAPSPADAQHWVQGLRKIIHHSGSMDQRQKLQSRPEPTAPPE ESFRSGVETTTPPQKQEPIDKELYPLTSLRSLFGNDPSSQKIEELFKKHKI VAVLRANSVEEAKKKALAVFLGGVHLIEITFTVPDADTVIKELSFLKEMG AIIGAGTVTSVEQCRKAVESGAEFIVSPHLDEEISQFCKEKGVFYMPGV MTPTELVKAMKLGHTILKLFPGEVVGPQFVKAMKGPFPNVKFVPTGG VNLDNVCEWFKAGVLAVGVGSALVKGTPVEVAEKAKAFVEKIRGCTE QKLISEEDLASNFTQFVLVDNGGTGDVTVAPSNFANGVAEWISSNSRS

		QAYKVTCSVRQSSAQKRKYTIKVEVPKVATQTVGGVELPVAAWRSYL NMELTIPIFATNSDCELIVKAMQGLLKDGNPIPSAIAANSGIY
VLP and EPN EGFP cargo MS2	incl. MS2	AUGGUGAGCAAGGGCGAGGAGCUGUUCACCGGGGUGGUGCCCA UCCUGGUCGAGCUGGACGGCGACGUAAACGGCCACAAGUUCAG CGUGUCCGGCGAGGGCGAGGGCGAUGCCACCUACGGCAAGCUG ACCCUGAAGUUCAUCUGCACCACCGGCAAGCUGCCCGUGCCCUG GCCCACCCUCGUGACCACCCUGACCUACGGCGUGCAGUGCUUCA GCCGCUACCCCGACCACAUGAAGCAGCACGACUUCUUCAAGUCC GCCAUGCCCGAAGGCUACGUCCAGGAGCGCACCAUCUUCUUCAA GGACGACGGCAACUACAAGACCCGCGCCGAGGUGAAGUUCGAG GGCGACACCCUGGUGAACCGCAUCGAGCUGAAGGGCAUCGACU UCAAGGAGGACGGCAACAUCCUGGGGCACAAGCUGGAGUACAA CUACAACAGCCACAACGUCUAUAUCAUGGCCGACAAGCAGAAGA ACGGCAUCAAGGUGAACUUCAAGAUCCGCCACAACAUCGAGGAC GGCAGCGUGCAGCUCGCCGACCACUACCAGCAGAACACCCCCAUC GGCGACGGCCCCGUGCUGCUGCCCGACAACCACUACCUGAGCAC CCAGUCCGCCCUGAGCAAAGACCCCAACGAGAAGCGCGAUCACA UGGUCCUGCUGGAGUUCGUGACCGCCGCCGGGAUCACUCUCGG CAUGGACGAGCUGUACAAGACCGGUUGAACGCGUAACAUGAGG AUCACCCAUGU
AAVS1 gRNA	gRNA, tracr, termination	GGGACCACCUUAUAUUCCCAGUUUAAGAGCUAUGCUGGAAACA GCAUAGCAAGUUUAAAUAAGGCUAGUCCGUUAUCAACUUGAAA AAGUGGCACCGAGUCGGUGCUUUUUUU
EGFP-P2A-Ascl1- PP7		AUGGUGAGCAAGGGCGAGGAGCUGUUCACCGGGGUGGUGCCCA UCCUGGUCGAGCUGGACGGCGACGUAAACGGCCACAAGUUCAG CGUGUCCGGCGAGGGCGAGGGCGAUGCCACCUACGGCAAGCUG ACCCUGAAGUUCAUCUGCACCACCGGCAAGCUGCCCGUGCCCUG GCCCACCCUCGUGACCACCCUGACCUACGGCGUGCAGUGCUUCA GCCGCUACCCCGACCACAUGAAGCAGCACGACUUCUUCAAGUCC GCCAUGCCCGAAGGCUACGUCCAGGAGCGCACCAUCUUCUUCAA GGACGACGGCAACUACAAGACCCGCGCCGAGGUGAAGUUCGAG GGCGACACCCUGGUGAACCGCAUCGAGCUGAAGGGCAUCGACU UCAAGGAGGACGGCAACAUCCUGGGGCACAAGCUGGAGUACAA CUACAACAGCCACAACGUCUAUAUCAUGGCCGACAAGCAGAAGA ACGGCAUCAAGGUGAACUUCAAGAUCCGCCACAACAUCGAGGAC GGCAGCGUGCAGCUCGCCGACCACUACCAGCAGAACACCCCCAUC GGCGACGGCCCCGUGCUGCUGCCCGACAACCACUACCUGAGCAC CCAGUCCGCCCUGAGCAAAGACCCCAACGAGAAGCGCGAUCACA UGGUCCUGCUGGAGUUCGUGACCGCCGCCGGGAUCACUCUCGG CAUGGACGAGCUGUACAAGACCGGUGACUACAAGGACGACGAC GACAAGGGAAGCGGCGCCACCAACUUUAGCCUGCUCAAACAGGC CGGGGACGUUGAAGAGAAUCCCGGACCUGGAUCCAUGGAAAGC UCUGCCAAGAUGGAGAGCGGCGGCGCCGGCCAGCAGCCCCAGCC GCAGCCCCAGCAGCCCUUCCUGCCGCCCGCAGCCUGUUUCUUUG CCACGGCCGCAGCCGCGGCGGCCGCAGCCGCCGCAGCGGCAGCG CAGAGCGCGCAGCAGCAGCAGCAGCAGCAGCAGCAGCAGCAGCA GGCGCCGCAGCUGAGACCGGCGGCCGACGGCCAGCCCUCAGGGG GCGGUCACAAGUCAGCGCCCAAGCAAGUCAAGCGACAGCGCUCG UCUUCGCCCGAACUGAUGCGCUGCAAACGCCGGCUCAACUUCAG CGGCUUUGGCUACAGCCUGCCGCAGCAGCAGCCGGCCGCCGUGG CGCGCCGCAACGAGCGCGAGCGCAACCGCGUCAAGUUGGUCAAC

		CUGGGCUUUGCCACCCUUCGGGAGCACGUCCCCAACGGCGCGGC CAACAAGAAGAUGAGUAAGGUGGAGACACUGCGCUCGGCGGUC GAGUACAUCCGCGCGCUGCAGCAGCUGCUGGACGAGCAUGACG CGGUGAGCGCCGCCUUCCAGGCAGGCGUCCUGUCGCCCACCAUC UCCCCCAACUACUCCAACGACUUGAACUCCAUGGCCGGCUCGCC GGUCUCAUCCUACUCGUCGGACGAGGGCUCUUACGACCCGCUC AGCCCCGAGGAGCAGGAGCUUCUCGACUUCACCAACUGGUUCU GAACGCGUGAAUUCCGACCAGAAGAUAUGGCUUCGGUUGGGU UCAAA
Cas13d-NCS-PP7	incl PP7	ACCAUGAUCGAGAAGAAGAAGUCCUUCGCCAAAGGCAUGGGCG UGAAGUCGACCCUGGUGUCCGGCAGCAAGGUGUACAUGACCAC AUUCGCCGAGGGCAGCGACGCCAGACUGGAAAAGAUUGUGGAA GGCGACAGCAUCCGCAGCGUGAACGAGGGCGAAGCUUUCUCUG CCGAGAUGGCCGAUAAGAACGCUGGCUACAAGAUCGGCAACGCC AAGUUCUCUCACCCCAAGGGCUAUGCCGUGGUGGCUAACAACCC ACUGUACACAGGACCCGUGCAGCAGGAUAUGCUGGGCCUGAAA GAGACUCUGGAAAAGCGGUACUUCGGCGAGAGCGCCGACGGCA ACGACAACAUCUGCAUCCAAGUGAUCCACAACAUCCUGGACAUC GAAAAGAUCCUGGCCGAGUACAUCACCAACGCCGCCUACGCCGU GAACAACAUCAGCGGCCUGGACAAGGACAUCAUCGGCUUCGGCA AGUUCAGCACCGUGUACACCUACGACGAGUUCAAGGACCCCGAG CACCACAGAGCCGCCUUCAACAACAACGACAAGCUGAUCAACGCC AUCAAGGCCCAGUACGAUGAGUUCGACAACUUCCUGGAUAACCC CAGACUGGGCUACUUCGGCCAAGCCUUCUUUAGCAAAGAGGGC CGCAACUACAUCAUCAACUACGGGAACGAGUGCUACGACAUUCU GGCCCUCUUAAGCGGCCUGAGGCACUGGGUCGUGCACAACAAU GAGGAAGAGAGCCGGAUAUCCAGAACCUGGCUGUACAACCUGG ACAAAAAUCUGGACAACGAGUAUAUCAGCACCCUGAACUACCUG UACGACCGGAUCACAAACGAGCUGACCAACAGCUUCAGCAAGAA CAGCGCCGCCAACGUGAACUAUAUCGCCGAGACACUGGGCAUCA ACCCCGCCGAGUUUGCCGAGCAGUACUUCAGAUUCAGCAUCAU GAAGGAACAGAAGAACCUGGGCUUCAACAUCACAAAGCUGCGG GAAGUGAUGCUGGACAGAAAGGACAUGAGCGAGAUCCGCAAGA ACCACAAGGUGUUCGACUCCAUCAGGACCAAGGUCUAUACCAUG AUGGACUUCGUGAUCUAUCGGUACUACAUCGAAGAGGACGCCA AGGUGGCCGCUGCCAACAAGUCUCUGCCCGACAACGAGAAGUCU CUGAGCGAGAAGGACAUCUUCGUGAUUAACCUGAGGGGCAGCU UCAACGACGACCAGAAGGACGCCCUGUACUACGAUGAGGCCAAC AGAAUUUGGCGGAAGCUGGAAAACAUCAUGCACAACAUCAAAG AGUUCCGGGGCAACAAGACCCGCGAGUACAAGAAGAAAGACGCC CCUAGACUGCCCAGAAUCCUGCCUGCUGGCAGAGAUGUGUCCG CCUUCUCUAAGCUGAUGUACGCCCUGACCAUGUUCCUGGACGG CAAAGAGAUCAACGACCUGCUGACCACACUGAUCAACAAGUUCG AUAACAUCCAGAGCUUUCUGAAAGUGAUGCCCCUGAUCGGCGU GAACGCUAAGUUCGUGGAAGAGUACGCCUUCUUCAAGGACAGC GCCAAGAUCGCCGACGAGCUGAGACUGAUCAAGAGCUUCGCCAG AAUGGGCGAGCCUAUCGCCGAUGCUAGAAGGGCCAUGUACAUC GACGCCAUUAGAAUCCUGGGCACCAACCUGAGCUACGACGAACU GAAGGCUCUGGCUGACACCUUCAGCCUGGACGAGAACGGCAACA AGCUGAAGAAAGGCAAGCACGGCAUGCGGAACUUUAUCAUCAA CAACGUGAUCAGCAACAAGCGGUUCCACUACCUGAUCAGAUACG GCGACCCCGCUCAUCUGCACGAGAUCGCUAAGAACGAGGCCGUG

		GUCAAGUUCGUGCUGGGCAGAAUCGCCGACAUCCAGAAGAAGC AGGGACAGAACGGAAAGAACCAGAUCGACCGCUACUACGAGACA UGCAUCGGCAAGGACAAGGGCAAGAGCGUGUCCGAGAAAGUGG ACGCUCUGACCAAGAUCAUCACCGGCAUGAACUACGACCAGUUU GACAAAAAGCGGAGCGUGAUCGAGGACACCGGCAGAGAGAAUG CCGAGAGAGAGAAGUUCAAGAAGAUCAUCUCCCUGUACCUGAC CGUGAUCUACCACAUCCUCAAGAACAUCGUGAACAUCAACGCUC GCUACGUGAUCGGCUUCCACUGCGUGGAAAGAGAUGCCCAGCU GUACAAAGAGAAGGGAUACGACAUCAACCUGAAGAAGCUCGAA GAAAAGGGCUUCAGCAGCGUGACCAAGCUGUGCGCUGGAAUCG ACGAGACAGCCCCUGACAAGCGGAAGGACGUGGAAAAAGAGAU GGCUGAGAGAGCCAAAGAGAGCAUCGACAGCCUGGAAAGCGCCA AUCCUAAGCUGUACGCCAAUUACAUCAAGUACUCCGACGAGAAG AAAGCCGAAGAGUUCACCAGGCAGAUCAACAGAGAGAAGGCCAA GACAGCCCUGAACGCCUACCUGAGAAACACCAAGUGGAAUGUGA UCAUCCGGGAAGAUCUGCUGCGGAUCGAUAACAAGACCUGCAC ACUGUUCAGAAACAAGGCCGUGCACCUGGAAGUCGCGAGAUAC GUGCACGCCUACAUCAACGACAUUGCCGAAGUGAACAGCUACUU CCAGCUCUACCACUAUAUCAUGCAGCGGAUCAUCAUGAACGAGC GAUAUGAGAAGUCCAGCGGCAAGGUGUCCGAGUACUUCGAUGC CGUGAACGAUGAGAAGAAGUACAACGACCGGCUGCUGAAACUG CUGUGCGUGCCAUUCGGCUACUGCAUCCCACGGUUCAAGAACC UGAGCAUCGAGGCCCUGUUCGACAGAAACGAGGCUGCCAAAUU CGACAAAGAAAAGAAAAAAGUGUCCGGGAACAGCGGAUCCACGC CGCCCAAGAAGAAGAGAAAGGUUGAGGACGGCGAGGGCUUGCA GCUGCCUCCACUGGAAAGACUGACACUCUCCGGAGCUGCUCCUG CCGCCAAGAAAAAGAAACUCGACUACAAGGACGACGACGACAAG UGAACGCGUGAAUUCCGACCAGAAGAUAUGGCUUCGGUUGGG UUCAAA
SARS-CoV-2 Cas13 crRNA PP7		GAACCCCUACCAACUGGUCGGGGUUUGAAACGUCAUCCAAUUU GAUGGCACCUGUGUGCUAGCGAAUUCCGACCAGAAGAUAUGGC UUCGGUUGGGUUCAAA
Cas13 non-target crRNA PP7		GAACCCCUACCAACUGGUCGGGGUUUGAAACCUCAAAGCGAUAC AUCAGCACCACUCGCUAGCGAAUUCCGACCAGAAGAUAUGGCUU CGGUUGGGUUCAAA

Cas9-NLS-NES-PP7	incl PP7	AUGGACAAGAAGUACAGCAUCGGCCUGGACAUCGGCACCAACUC UGUGGGCUGGGCCGUGAUCACCGACGAGUACAAGGUGCCCAGC AAGAAAUUCAAGGUGCUGGGCAACACCGACCGGCACAGCAUCAA GAAGAACCUGAUCGGAGCCCUGCUGUUCGACAGCGGCGAAACA GCCGAGGCCACCCGGCUGAAGAGAACCGCCAGAAGAAGAUACAC CAGACGGAAGAACCGGAUCUGCUAUCUGCAAGAGAUCUUCAGC AACGAGAUGGCCAAGGUGGACGACAGCUUCUUCCACAGACUGG AAGAGUCCUUCCUGGUGGAAGAGGAUAAGAAGCACGAGCGGCA CCCCAUCUUCGGCAACAUCGUGGACGAGGUGGCCUACCACGAGA AGUACCCCACCAUCUACCACCUGAGAAAGAAACUGGUGGACAGC ACCGACAAGGCCGACCUGCGGCUGAUCUAUCUGGCCCUGGCCCA CAUGAUCAAGUUCCGGGGCCACUUCCUGAUCGAGGGCGACCUG AACCCCGACAACAGCGACGUGGACAAGCUGUUCAUCCAGCUGGU GCAGACCUACAACCAGCUGUUCGAGGAAAACCCCAUCAACGCCA GCGGCGUGGACGCCAAGGCCAUCCUGUCUGCCAGACUGAGCAA GAGCAGACGGCUGGAAAAUCUGAUCGCCCAGCUGCCCGGCGAG AAGAAGAAUGGCCUGUUCGGCAACCUGAUUGCCCUGAGCCUGG GCCUGACCCCCAACUUCAAGAGCAACUUCGACCUGGCCGAGGAU GCCAAACUGCAGCUGAGCAAGGACACCUACGACGACGACCUGGA CAACCUGCUGGCCCAGAUCGGCGACCAGUACGCCGACCUGUUUC UGGCCGCCAAGAACCUGUCCGACGCCAUCCUGCUGAGCGACAUC CUGAGAGUGAACACCGAGAUCACCAAGGCCCCCCUGAGCGCCUC UAUGAUCAAGAGAUACGACGAGCACCACCAGGACCUGACCCUGC UGAAAGCUCUCGUGCGGCAGCAGCUGCCUGAGAAGUACAAAGA GAUUUUCUUCGACCAGAGCAAGAACGGCUACGCCGGCUACAUU GACGGCGGAGCCAGCCAGGAAGAGUUCUACAAGUUCAUCAAGC CCAUCCUGGAAAAGAUGGACGGCACCGAGGAACUGCUCGUGAA GCUGAACAGAGAGGACCUGCUGCGGAAGCAGCGGACCUUCGAC AACGGCAGCAUCCCCCACCAGAUCCACCUGGGAGAGCUGCACGC CAUUCUGCGGCGGCAGGAAGAUUUUUACCCAUUCCUGAAGGAC AACCGGGAAAAGAUCGAGAAGAUCCUGACCUUCCGCAUCCCCUA CUACGUGGGCCCUCUGGCCAGGGGAAACAGCAGAUUCGCCUGG AUGACCAGAAAGAGCGAGGAAACCAUCACCCCCUGGAACUUCGA GGAAGUGGUGGACAAGGGCGCUUCCGCCCAGAGCUUCAUCGAG CGGAUGACCAACUUCGAUAAGAACCUGCCCAACGAGAAGGUGCU GCCCAAGCACAGCCUGCUGUACGAGUACUUCACCGUGUAUAACG AGCUGACCAAAGUGAAAUACGUGACCGAGGGAAUGAGAAAGCC CGCCUUCCUGAGCGGCGAGCAGAAAAAGGCCAUCGUGGACCUGC UGUUCAAGACCAACCGGAAAGUGACCGUGAAGCAGCUGAAAGA GGACUACUUCAAGAAAAUCGAGUGCUUCGACUCCGUGGAAAUC UCCGGCGUGGAAGAUCGGUUCAACGCCUCCCUGGGCACAUACCA CGAUCUGCUGAAAAUUAUCAAGGACAAGGACUUCCUGGACAAU GAGGAAAACGAGGACAUUCUGGAAGAUAUCGUGCUGACCCUGA CACUGUUUGAGGACAGAGAGAUGAUCGAGGAACGGCUGAAAAC CUAUGCCCACCUGUUCGACGACAAAGUGAUGAAGCAGCUGAAG CGGCGGAGAUACACCGGCUGGGGCAGGCUGAGCCGGAAGCUGA UCAACGGCAUCCGGGACAAGCAGUCCGGCAAGACAAUCCUGGAU UUCCUGAAGUCCGACGGCUUCGCCAACAGAAACUUCAUGCAGCU GAUCCACGACGACAGCCUGACCUUUAAAGAGGACAUCCAGAAAG CCCAGGUGUCCGGCCAGGGCGAUAGCCUGCACGAGCACAUUGCC AAUCUGGCCGGCAGCCCCGCCAUUAAGAAGGGCAUCCUGCAGAC AGUGAAGGUGGUGGACGAGCUCGUGAAAGUGAUGGGCCGGCA CAAGCCCGAGAACAUCGUGAUCGAAAUGGCCAGAGAGAACCAGA

		CCACCCAGAAGGGACAGAAGAACAGCCGCGAGAGAAUGAAGCGG AUCGAAGAGGGCAUCAAAGAGCUGGGCAGCCAGAUCCUGAAAG AACACCCCGUGGAAAACACCCAGCUGCAGAACGAGAAGCUGUAC CUGUACUACCUGCAGAAUGGGCGGGAUAUGUACGUGGACCAGG AACUGGACAUCAACCGGCUGUCCGACUACGAUGUGGACCAUAU CGUGCCUCAGAGCUUUCUGAAGGACGACUCCAUCGACAACAAG GUGCUGACCAGAAGCGACAAGAACCGGGGCAAGAGCGACAACGU GCCCUCCGAAGAGGUCGUGAAGAAGAUGAAGAACUACUGGCGG CAGCUGCUGAACGCCAAGCUGAUUACCCAGAGAAAGUUCGACAA UCUGACCAAGGCCGAGAGAGGCGGCCUGAGCGAACUGGAUAAG GCCGGCUUCAUCAAGAGACAGCUGGUGGAAACCCGGCAGAUCAC AAAGCACGUGGCACAGAUCCUGGACUCCCGGAUGAACACUAAGU ACGACGAGAAUGACAAGCUGAUCCGGGAAGUGAAAGUGAUCAC CCUGAAGUCCAAGCUGGUGUCCGAUUUCCGGAAGGAUUUCCAG UUUUACAAAGUGCGCGAGAUCAACAACUACCACCACGCCCACGA CGCCUACCUGAACGCCGUCGUGGGAACCGCCCUGAUCAAAAAGU ACCCUAAGCUGGAAAGCGAGUUCGUGUACGGCGACUACAAGGU GUACGACGUGCGGAAGAUGAUCGCCAAGAGCGAGCAGGAAAUC GGCAAGGCUACCGCCAAGUACUUCUUCUACAGCAACAUCAUGAA CUUUUUCAAGACCGAGAUUACCCUGGCCAACGGCGAGAUCCGG AAGCGGCCUCUGAUCGAGACAAACGGCGAAACCGGGGAGAUCG UGUGGGAUAAGGGCCGGGAUUUUGCCACCGUGCGGAAAGUGC UGAGCAUGCCCCAAGUGAAUAUCGUGAAAAAGACCGAGGUGCA GACAGGCGGCUUCAGCAAAGAGUCUAUCCUGCCCAAGAGGAACA GCGAUAAGCUGAUCGCCAGAAAGAAGGACUGGGACCCUAAGAA GUACGGCGGCUUCGACAGCCCCACCGUGGCCUAUUCUGUGCUG GUGGUGGCCAAAGUGGAAAAGGGCAAGUCCAAGAAACUGAAGA GUGUGAAAGAGCUGCUGGGGAUCACCAUCAUGGAAAGAAGCAG CUUCGAGAAGAAUCCCAUCGACUUUCUGGAAGCCAAGGGCUAC AAAGAAGUGAAAAAGGACCUGAUCAUCAAGCUGCCUAAGUACU CCCUGUUCGAGCUGGAAAACGGCCGGAAGAGAAUGCUGGCCUC UGCCGGCGAACUGCAGAAGGGAAACGAACUGGCCCUGCCCUCCA AAUAUGUGAACUUCCUGUACCUGGCCAGCCACUAUGAGAAGCU GAAGGGCUCCCCCGAGGAUAAUGAGCAGAAACAGCUGUUUGUG GAACAGCACAAGCACUACCUGGACGAGAUCAUCGAGCAGAUCAG CGAGUUCUCCAAGAGAGUGAUCCUGGCCGACGCUAAUCUGGAC AAAGUGCUGUCCGCCUACAACAAGCACCGGGAUAAGCCCAUCAG AGAGCAGGCCGAGAAUAUCAUCCACCUGUUUACCCUGACCAAUC UGGGAGCCCCUGCCGCCUUCAAGUACUUUGACACCACCAUCGAC CGGAAGAGGUACACCAGCACCAAAGAGGUGCUGGACGCCACCCU GAUCCACCAGAGCAUCACCGGCCUGUACGAGACACGGAUCGACC UGUCUCAGCUGGGAGGCGACGGAUCCACGCCGCCCAAGAAGAA GAGAAAGGUUGAGGACGGCGAGGGCCCAGCCGCUAAGAGAGUG AAACUGGAUUCCGGAGCUGCUCCUGCCGCCAAGAAAAAGAAACU CGACUACAAGGACGACGACGACAAGUUGCAGCUGCCCCCUCUCG AAAGGCUGACUCUCUGAACGCGUGAAUUCCGACCAGAAGAUAU GGCUUCGGUUGGGUUCAAA
Exon51 DMD gRNA1 PP7	gRNA, PP7, tracr, termination	AGAGUUCCUAAGGUAGAGAGGUUUAAGAGCUAUGCUGGAGGG GAAUUCCGACCAGAAGAUAUGGCUUCGGUUGGGUUCAAACCCA ACAGCAUAGCAAGUUUAAAUAAGGCUAGUCCGUUAUCAACUUG AAAAAGUGGCACCGAGUCGGUGCUGAGACGCGCGGUUCUAUCU AGUUACGCGUUAAACCAACUAGAAUUUUUU

Exon51 DMD gRNA2 PP7	gRNA, PP7, tracr, termination	AUAAAGAUAAGAGCUGGCAGGUUUAAGAGCUAUGCUGGAGGG GAAUUCCGACCAGAAGAUAUGGCUUCGGUUGGGUUCAAACCCA ACAGCAUAGCAAGUUUAAAUAAGGCUAGUCCGUUAUCAACUUG AAAAAGUGGCACCGAGUCGGUGCUGAGACGCGCGGUUCUAUCU AGUUACGCGUUAAACCAACUAGAAUUUUUU
mRuby3-PP7	mRuby3, RNA size 1000nt, PP7	AUGGGAUCCGUGUCCAAGGGCGAAGAACUGAUCAAAGAAAACA UGCGGAUGAAGGUGGUCAUGGAAGGCAGCGUGAACGGCCACCA GUUCAAGUGUACAGGCGAAGGCGAGGGCAGACCUUAUGAGGGC GUGCAGACCAUGAGAAUCAAAGUGAUCGAAGGCGGCCCUCUGC CUUUCGCUUUCGACAUCCUGGCCACCAGCUUUAUGUACGGCAG CAGAACCUUCAUCAAGUACCCCGCUGACAUCCCCGAUUUCUUCA AGCAGAGCUUCCCCGAGGGCUUCACCUGGGAGAGAGUGACCAG AUACGAGGAUGGCGGCGUGGUCACAGUGACCCAGGACACAUCU CUGGAAGAUGGCGAGCUGGUGUACAACGUGAAAGUGCGGGGC GUGAACUUCCCCUCUAACGGCCCUGUGAUGCAGAAAAAGACCAA AGGCUGGGAGCCCAACACCGAGAUGAUGUACCCUGCUGAUGGC GGCCUGAGAGGCUACACAGAUAUCGCCCUGAAAGUGGACGGCG GAGGCCAUCUGCACUGCAACUUCGUGACCACCUACAGGUCCAAG AAAACCGUGGGCAACAUCAAGAUGCCUGGGGUGCACGCCGUGG ACCACAGACUGGAAAGAAUCGAGGAAAGCGACAACGAGACAUAC GUGGUGCAGCGCGAAGUGGCCGUGGCCAAGUACUCUAAUCUCG GAGGCGGCAUGGACGAGCUGUACAAAGGAUCUCUCCAGCUGCC ACCUCUGGAAAGACUGACCCUGCAGGCAGGCUACCCUUACGACG UGCCAGAUUACGCCUGAACGCGUGAAUUCCGACCAGAAGAUAU GGCUUCGGUUGGGUUCAAA
mRuby3-Fillerup2000nt-PP7	mRuby3, RNA size 2000nt, PP7	AUGGGAUCCGUGUCCAAGGGCGAAGAACUGAUCAAAGAAAACA UGCGGAUGAAGGUGGUCAUGGAAGGCAGCGUGAACGGCCACCA GUUCAAGUGUACAGGCGAAGGCGAGGGCAGACCUUAUGAGGGC GUGCAGACCAUGAGAAUCAAAGUGAUCGAAGGCGGCCCUCUGC CUUUCGCUUUCGACAUCCUGGCCACCAGCUUUAUGUACGGCAG CAGAACCUUCAUCAAGUACCCCGCUGACAUCCCCGAUUUCUUCA AGCAGAGCUUCCCCGAGGGCUUCACCUGGGAGAGAGUGACCAG AUACGAGGAUGGCGGCGUGGUCACAGUGACCCAGGACACAUCU CUGGAAGAUGGCGAGCUGGUGUACAACGUGAAAGUGCGGGGC GUGAACUUCCCCUCUAACGGCCCUGUGAUGCAGAAAAAGACCAA AGGCUGGGAGCCCAACACCGAGAUGAUGUACCCUGCUGAUGGC GGCCUGAGAGGCUACACAGAUAUCGCCCUGAAAGUGGACGGCG GAGGCCAUCUGCACUGCAACUUCGUGACCACCUACAGGUCCAAG AAAACCGUGGGCAACAUCAAGAUGCCUGGGGUGCACGCCGUGG ACCACAGACUGGAAAGAAUCGAGGAAAGCGACAACGAGACAUAC GUGGUGCAGCGCGAAGUGGCCGUGGCCAAGUACUCUAAUCUCG GAGGCGGCAUGGACGAGCUGUACAAAGGAUCUCUCCAGCUGCC ACCUCUGGAAAGACUGACCCUGCAGGCAGGCUACCCUUACGACG UGCCAGAUUACGCCUGAGGUACCCUUGUACAGCUCGUCCAUGC CGAGAGUGAUCCCGGCGGCGGUCACGAACUCCAGCAGGACCAUG UGAUCGCGCUUCUCGUUGGGGUCUUUGCUCAGGGCGGACUGG GUGCUCAGGUAGUGGUUGUCGGGCAGCAGCACGGGGCCGUCGC CGAUGGGGGUGUUCUGCUGGUAGUGGUCGGCGAGCUGCACGC UGCCGUCCUCGAUGUUGUGGCGGAUCUUGAAGUUCACCUUGA UGCCGUUCUUCUGCUUGUCGGCCAUGAUAUAGACGUUGUGGC UGUUGUAGUUGUACUCCAGCUUGUGCCCCAGGAUGUUGCCGU CCUCCUUGAAGUCGAUGCCCUUCAGCUCGAUGCGGUUCACCAG

		GGUGUCGCCCUCGAACUUCACCUCGGCGCGGGUCUUGUAGUUG CCGUCGUCCUUGAAGAAGAUGGUGCGCUCCUGGACGUAGCCUU CGGGCAUGGCGGACUUGAAGAAGUCGUGCUGCUUCAUGUGGU CGGGGUAGCGGCUGAAGCACUGCACGCCGUAGGUCAGGGUGGU CACGAGGGUGGGCCAGGGCACGGGCAGCUUGCCGGUGGUGCAG AUGAACUUCAGGGUCAGCUUGCCGUAGGUGGCAUCGCCCUCGC CCUCGCCGGACACGCUGAACUUGUGGCCGUUUACGUCGCCGUC CAGCUCGACCAGGAUGGGCACCACCCCGGUGAACAGCUCCUCGC CCUUGCUCACCAUACGCGUGAAUUCCGACCAGAAGAUAUGGCU UCGGUUGGGUUCAAA
mRuby3-Fillerup4000nt-PP7	mRuby3, RNA size 4000nt, PP7	AUGGGAUCCGUGUCCAAGGGCGAAGAACUGAUCAAAGAAAACA UGCGGAUGAAGGUGGUCAUGGAAGGCAGCGUGAACGGCCACCA GUUCAAGUGUACAGGCGAAGGCGAGGGCAGACCUUAUGAGGGC GUGCAGACCAUGAGAAUCAAAGUGAUCGAAGGCGGCCCUCUGC CUUUCGCUUUCGACAUCCUGGCCACCAGCUUUAUGUACGGCAG CAGAACCUUCAUCAAGUACCCCGCUGACAUCCCCGAUUUCUUCA AGCAGAGCUUCCCCGAGGGCUUCACCUGGGAGAGAGUGACCAG AUACGAGGAUGGCGGCGUGGUCACAGUGACCCAGGACACAUCU CUGGAAGAUGGCGAGCUGGUGUACAACGUGAAAGUGCGGGGC GUGAACUUCCCCUCUAACGGCCCUGUGAUGCAGAAAAAGACCAA AGGCUGGGAGCCCAACACCGAGAUGAUGUACCCUGCUGAUGGC GGCCUGAGAGGCUACACAGAUAUCGCCCUGAAAGUGGACGGCG GAGGCCAUCUGCACUGCAACUUCGUGACCACCUACAGGUCCAAG AAAACCGUGGGCAACAUCAAGAUGCCUGGGGUGCACGCCGUGG ACCACAGACUGGAAAGAAUCGAGGAAAGCGACAACGAGACAUAC GUGGUGCAGCGCGAAGUGGCCGUGGCCAAGUACUCUAAUCUCG GAGGCGGCAUGGACGAGCUGUACAAAGGAUCUCUCCAGCUGCC ACCUCUGGAAAGACUGACCCUGCAGGCAGGCUACCCUUACGACG UGCCAGAUUACGCCUGAGGUACCCUUGUACAGCUCGUCCAUGC CGAGAGUGAUCCCGGCGGCGGUCACGAACUCCAGCAGGACCAUG UGAUCGCGCUUCUCGUUGGGGUCUUUGCUCAGGGCGGACUGG GUGCUCAGGUAGUGGUUGUCGGGCAGCAGCACGGGGCCGUCGC CGAUGGGGGUGUUCUGCUGGUAGUGGUCGGCGAGCUGCACGC UGCCGUCCUCGAUGUUGUGGCGGAUCUUGAAGUUCACCUUGA UGCCGUUCUUCUGCUUGUCGGCCAUGAUAUAGACGUUGUGGC UGUUGUAGUUGUACUCCAGCUUGUGCCCCAGGAUGUUGCCGU CCUCCUUGAAGUCGAUGCCCUUCAGCUCGAUGCGGUUCACCAG GGUGUCGCCCUCGAACUUCACCUCGGCGCGGGUCUUGUAGUUG CCGUCGUCCUUGAAGAAGAUGGUGCGCUCCUGGACGUAGCCUU CGGGCAUGGCGGACUUGAAGAAGUCGUGCUGCUUCAUGUGGU CGGGGUAGCGGCUGAAGCACUGCACGCCGUAGGUCAGGGUGGU CACGAGGGUGGGCCAGGGCACGGGCAGCUUGCCGGUGGUGCAG AUGAACUUCAGGGUCAGCUUGCCGUAGGUGGCAUCGCCCUCGC CCUCGCCGGACACGCUGAACUUGUGGCCGUUUACGUCGCCGUC CAGCUCGACCAGGAUGGGCACCACCCCGGUGAACAGCUCCUCGC CCUUGCUCACCAUUAAGGUACCUCUGGUGGGUAUAGAUUCUGU GUAAAAUUGAUUCCAAUGCCAUCCACUUGAUAGGCACUUUGCC UCCUUCUGCAUGGUAUUCUUUCUCUUCCGCACCCAGCAGUUUG GCCAGCCCAAAAUCUGUGAUCUUGACAUGCUGCGGUGUUUUCA CCAGUACGUUCCUGGCUGCCAGGUCGCGGUGCACCAAGCGACG GUCCUCCAAGUAGUUCAUGCCCUUUGCGAUCUGCACACACCAG UUGAGCAGGUACUGGGAGCCAAUAUUGUCUUUGUGUUCCCGG

		ACAUAGUCCAGGAGGCAGCCGAAGGGCAUGAGCUGCGUGAUGA GUUGCACGGUGGAGGUGAGGCAGAUGCCCAGCAGGCGGCACAC GUGGGGGUUGUCCACGCUGGCCAUCACGUAGGCUUCAUCGAGG AUUUCCUUGUUGGCUUUCGGAGAUGUUGCUUCUCUUAAUUCC UUGAUAGCGACGGGAAUUUUAACUUUCUCACCUUCUGGGAUCC AGAGUCCCUUAUACACCGUGCCGAACGCACCGGAGCCCAGCACU UUGAUCUUUUUGAAUUCAGUUUCCUUCAAGAUCCUCAAGAGA GCUUGGUUGGGAGCUUCUCCACUGGGUGUAAGAGGCUCCACAA GCUCCCUCUCCUGCAGCAGCCUCCGCAGCGUGCGCUUCCGAACG AUGUGGCGCCUUCGCAUGAAGAGGCCGAUCCCCAGGGCCACCAC CAGCAGCAAGAGGAGGGCCCCCACCAUCCCAGUGGCGAUGGACG GGAUCUUAGGCCCAUUCGUUGGACAGCCUUCAAGACCUGGCCC AGUGCAUCCGUAGGUGCAGUUUGGAUGGCACAGGUGGCACACA UGGCCGGCGUCUGCGUACUUCCAGACCAGGGUGUUGUUUUCUC CCAUGACUCCUGCCGGGCAGGUCUUGACGCAGUGGGGGCCGUC AAUGUAGUGGGCACACUGGAUACAGUUGUCUGGUCCCCGUCCU GUGCAGGUGAUGUUCAUGGCCUGAGGCAGGCACUCUGGGUGG CACUGUAUGCACUCAGAGUUCUCCACAAACUCCCUUGGCUCACC CUCCAGAAGGUUGCACUUGUCCACGCAUUCCCUGCCUCGGCUG ACAUUCCGGCAAGAGACGCAGUCCCUGGGCUCCGGGCCCCAGCA GCCCUCGGGGGAGCACAAGGCAUGGCAGACCUGGCCUGUGGCC UUGCAGCUGUUUUCACCUCUGUUGCUUAUAAUUUUGGUUUUC UGACCGGAGGUCCCAAACAGUUUUUUCCAGUUUAUUGUAUUU GCAUAGCACAAAUUUUUGUUUCCUGAAAUUAUCACAUCUCCAU CACUUAUCUCCUUGAGGGAGCGUAAUCCCAAGGAUGUUAUGUU CAGGCUGACGACUGCAAGAGAAAACUGACCAUGUUGCUUGGUC CUGCCGCGUAUGAUUUCUAGGUUCUCAAAGGCAUGGAGGUCCG UCCUGUUUUCAGGCCAAGCCUGAAUCAGCAAAAACCCUGUGAU UUCCUUUACGGUUUUCAGAAUAUCCAGUUCCUGUGGAUCCAGA GGAGGAGUAUGUGUGAAGGAGUCACCCCUAAAUGCCACCGGCA GGAUGUGGAGAUCGCCACUGAUGGAGGUGCAGUUUUUGAAGU GUUUAAUAUUCGUAGCAUUUAUGGAGAGUGAGUCUUUAAAUU CACCAAUACCUAUUCCGUUACACACUUUGCGGCAAGGCCCUUCG CACUUCUUACACUUGCGGACGCCGUCUUCCUCCAUCUCAUAGCU GUCGGCCCCACAGGCUCGGACGCACGAGCCGUGAUCUGUCACCA CAUAAUUACGGGGACACUUCUUCACGCAGGUGGCACCAAAGCU GUAUUUGCCCUCGGGGUUCACAUCCAUCUGGUACGUGGUGGG GUUGUAGAGCAUGAGUGGGGGGCAGGUGUCCUUGCACGUGGC UUCGUCUCGGAAUUUGCGGCAGACCAGGCAGUCGCUCUCCCGG GGGCCUGUGCAGCCUGCAGCACACUGGUUGUGGCAGCAGUCAC UGGGGGACUUGACGCGUGAAUUCCGACCAGAAGAUAUGGCUUC GGUUGGGUUCAAA

mRuby3-Fillerup6000nt-PP7	mRuby3, RNA size 6000nt, PP7	AUGGGAUCCGUGUCCAAGGGCGAAGAACUGAUCAAAGAAAACA UGCGGAUGAAGGUGGUCAUGGAAGGCAGCGUGAACGGCCACCA GUUCAAGUGUACAGGCGAAGGCGAGGGCAGACCUUAUGAGGGC GUGCAGACCAUGAGAAUCAAAGUGAUCGAAGGCGGCCCUCUGC CUUUCGCUUUCGACAUCCUGGCCACCAGCUUUAUGUACGGCAG CAGAACCUUCAUCAAGUACCCCGCUGACAUCCCCGAUUUCUUCA AGCAGAGCUUCCCCGAGGGCUUCACCUGGGAGAGAGUGACCAG AUACGAGGAUGGCGGCGUGGUCACAGUGACCCAGGACACAUCU CUGGAAGAUGGCGAGCUGGUGUACAACGUGAAAGUGCGGGGC GUGAACUUCCCCUCUAACGGCCCUGUGAUGCAGAAAAAGACCAA AGGCUGGGAGCCCAACACCGAGAUGAUGUACCCUGCUGAUGGC GGCCUGAGAGGCUACACAGAUAUCGCCCUGAAAGUGGACGGCG GAGGCCAUCUGCACUGCAACUUCGUGACCACCUACAGGUCCAAG AAAACCGUGGGCAACAUCAAGAUGCCUGGGGUGCACGCCGUGG ACCACAGACUGGAAAGAAUCGAGGAAAGCGACAACGAGACAUAC GUGGUGCAGCGCGAAGUGGCCGUGGCCAAGUACUCUAAUCUCG GAGGCGGCAUGGACGAGCUGUACAAAGGAUCUCUCCAGCUGCC ACCUCUGGAAAGACUGACCCUGCAGGCAGGCUACCCUUACGACG UGCCAGAUUACGCCUGAGGUACCCUUGUACAGCUCGUCCAUGC CGAGAGUGAUCCCGGCGGCGGUCACGAACUCCAGCAGGACCAUG UGAUCGCGCUUCUCGUUGGGGUCUUUGCUCAGGGCGGACUGG GUGCUCAGGUAGUGGUUGUCGGGCAGCAGCACGGGGCCGUCGC CGAUGGGGGUGUUCUGCUGGUAGUGGUCGGCGAGCUGCACGC UGCCGUCCUCGAUGUUGUGGCGGAUCUUGAAGUUCACCUUGA UGCCGUUCUUCUGCUUGUCGGCCAUGAUAUAGACGUUGUGGC UGUUGUAGUUGUACUCCAGCUUGUGCCCCAGGAUGUUGCCGU CCUCCUUGAAGUCGAUGCCCUUCAGCUCGAUGCGGUUCACCAG GGUGUCGCCCUCGAACUUCACCUCGGCGCGGGUCUUGUAGUUG CCGUCGUCCUUGAAGAAGAUGGUGCGCUCCUGGACGUAGCCUU CGGGCAUGGCGGACUUGAAGAAGUCGUGCUGCUUCAUGUGGU CGGGGUAGCGGCUGAAGCACUGCACGCCGUAGGUCAGGGUGGU CACGAGGGUGGGCCAGGGCACGGGCAGCUUGCCGGUGGUGCAG AUGAACUUCAGGGUCAGCUUGCCGUAGGUGGCAUCGCCCUCGC CCUCGCCGGACACGCUGAACUUGUGGCCGUUUACGUCGCCGUC CAGCUCGACCAGGAUGGGCACCACCCCGGUGAACAGCUCCUCGC CCUUGCUCACCAUUAAGGUACCUCUGGUGGGUAUAGAUUCUGU GUAAAAUUGAUUCCAAUGCCAUCCACUUGAUAGGCACUUUGCC UCCUUCUGCAUGGUAUUCUUUCUCUUCCGCACCCAGCAGUUUG GCCAGCCCAAAAUCUGUGAUCUUGACAUGCUGCGGUGUUUUCA CCAGUACGUUCCUGGCUGCCAGGUCGCGGUGCACCAAGCGACG GUCCUCCAAGUAGUUCAUGCCCUUUGCGAUCUGCACACACCAG UUGAGCAGGUACUGGGAGCCAAUAUUGUCUUUGUGUUCCCGG ACAUAGUCCAGGAGGCAGCCGAAGGGCAUGAGCUGCGUGAUGA GUUGCACGGUGGAGGUGAGGCAGAUGCCCAGCAGGCGGCACAC GUGGGGGUUGUCCACGCUGGCCAUCACGUAGGCUUCAUCGAGG AUUUCCUUGUUGGCUUUCGGAGAUGUUGCUUCUCUUAAUUCC UUGAUAGCGACGGGAAUUUUAACUUUCUCACCUUCUGGGAUCC AGAGUCCCUUAUACACCGUGCCGAACGCACCGGAGCCCAGCACU UUGAUCUUUUUGAAUUCAGUUUCCUUCAAGAUCCUCAAGAGA GCUUGGUUGGGAGCUUCUCCACUGGGUGUAAGAGGCUCCACAA GCUCCCUCUCCUGCAGCAGCCUCCGCAGCGUGCGCUUCCGAACG AUGUGGCGCCUUCGCAUGAAGAGGCCGAUCCCCAGGGCCACCAC CAGCAGCAAGAGGAGGGCCCCCACCAUCCCAGUGGCGAUGGACG

		GGAUCUUAGGCCCAUUCGUUGGACAGCCUUCAAGACCUGGCCC AGUGCAUCCGUAGGUGCAGUUUGGAUGGCACAGGUGGCACACA UGGCCGGCGUCUGCGUACUUCCAGACCAGGGUGUUGUUUUCUC CCAUGACUCCUGCCGGGCAGGUCUUGACGCAGUGGGGGCCGUC AAUGUAGUGGGCACACUGGAUACAGUUGUCUGGUCCCCGUCCU GUGCAGGUGAUGUUCAUGGCCUGAGGCAGGCACUCUGGGUGG CACUGUAUGCACUCAGAGUUCUCCACAAACUCCCUUGGCUCACC CUCCAGAAGGUUGCACUUGUCCACGCAUUCCCUGCCUCGGCUG ACAUUCCGGCAAGAGACGCAGUCCCUGGGCUCCGGGCCCCAGCA GCCCUCGGGGGAGCACAAGGCAUGGCAGACCUGGCCUGUGGCC UUGCAGCUGUUUUCACCUCUGUUGCUUAUAAUUUUGGUUUUC UGACCGGAGGUCCCAAACAGUUUUUUCCAGUUUAUUGUAUUU GCAUAGCACAAAUUUUUGUUUCCUGAAAUUAUCACAUCUCCAU CACUUAUCUCCUUGAGGGAGCGUAAUCCCAAGGAUGUUAUGUU CAGGCUGACGACUGCAAGAGAAAACUGACCAUGUUGCUUGGUC CUGCCGCGUAUGAUUUCUAGGUUCUCAAAGGCAUGGAGGUCCG UCCUGUUUUCAGGCCAAGCCUGAAUCAGCAAAAACCCUGUGAU UUCCUUUACGGUUUUCAGAAUAUCCAGUUCCUGUGGAUCCAGA GGAGGAGUAUGUGUGAAGGAGUCACCCCUAAAUGCCACCGGCA GGAUGUGGAGAUCGCCACUGAUGGAGGUGCAGUUUUUGAAGU GUUUAAUAUUCGUAGCAUUUAUGGAGAGUGAGUCUUUAAAUU CACCAAUACCUAUUCCGUUACACACUUUGCGGCAAGGCCCUUCG CACUUCUUACACUUGCGGACGCCGUCUUCCUCCAUCUCAUAGCU GUCGGCCCCACAGGCUCGGACGCACGAGCCGUGAUCUGUCACCA CAUAAUUACGGGGACACUUCUUCACGCAGGUGGCACCAAAGCU GUAUUUGCCCUCGGGGUUCACAUCCAUCUGGUACGUGGUGGG GUUGUAGAGCAUGAGUGGGGGGCAGGUGUCCUUGCACGUGGC UUCGUCUCGGAAUUUGCGGCAGACCAGGCAGUCGCUCUCCCGG GGGCCUGUGCAGCCUGCAGCACACUGGUUGUGGCAGCAGUCAC UGGGGGACUUGGUCGACCCUCCGUGUUGGAGAGCUGGUACCA GGGCUGCUUGCCGUAGGUGAAGAUCUCCCAGAGCACCACGCCG AAGCUCCACACGUCGCUCUCGGUGGUGAACUUACGGUACAGGA UGCUCUCGGGCGGCAUCCAGCGAAUGGGCAGCAUGGUGCGGCC UCCCACACGGUAAUAGUCGGUGCUGUAGAUAUCCCUGCUCAUG CCAAAAUCACCAAUCUUGACCACCAGUCCCUGGCCCACUAGACA GUUGCGUGUGGCCAGGUCCCGGUGCACAAAAUGCAGACCCGCC AGGUACACCAUCCCCGCAGCGACCUGGCUAGCCACGGCCAGCAG CUGCCCCAGACCCAGGGGGCCUGGAGCCACAUCCUCCCCACCAGC CAGCAGCUUGGCAUCAGGUCCAUGGGAUCGGAGGAAGCGGUUG AGGUCCCCGUGCCGCAUAUACUCAAAGACCAUGAGCAGGGGGC GGCCCUCGGUGCAGACGCCGAAGAAGCGCACGAUGUGCUGGUG CUGCAGCAUGGUGAGCAGCUCAGCCUCACGCUGGAAGUCCUGC CGAGCACUCUCGGACGCCUCCUUCAGUGCCUUGACAGCCACCAG CAUCUUGUCCUGCUCAGGCAGGAGGUUGUGGCACUCAGCAAGG AAGACCUUCCCAAAGGCGCCCUCCCCCAGCUCCCACUUGAGCACG AUGUCCCGGCGCUUGAUGUGGUGAACACAGGCAUCACUGAAGU AUUGUGGGUUCUCGAUGAUGUGGCCUUGGAGCCCAGAGCCUU UGCCCUCGGUGGGGGACAGGGAGCUGCCACCCAAUGUCAUGAA AUGCAGGGACAUGGCCAGCCCAUCCUCUGGAGCCAGCACAGCCG GGCGGUUGAUCCCAAACUUGUUUCUCCGUCCACAUUUGUUGAG CACAAGGAGCAGCGUAGAAAGGAAGAGGCAGGCAAAGACGGCC AGGCCCACAGCCACCGAGACCCCAAAAGGUGUUUCGUCCUUCUU CUCCACCGGGUCUCCAGAUGUGCUGUUAGUGUCCACCGGCGAG

		AAGGAGACAGGGAUGGGGUCCUCGGGGUUGAACUCGAAAGGG UUGUCCAUGAAGGCAGCCAUGAUGGAGGCGGAGGCCUGGCCGA AGGGGUUGGCAGCCAGCAGCGUGUAGUUGCCGUUGUUGACGU GGGUGGGCUGGUUGAGGCGCAGACACCCGUGCCGCACGGUCUC AUUGGCUGCCGGCUCCAGGAACUCAGUGAAGAUGAAGCUGGUC UCAUUGAGCACGGAGCCAUUGAAGAGCCAGCGCAGAGACGGUG CCGGCUGCCCAUCCACAGAGAAGGGGAUGCACCAGUGGUGCAUC UCCACCGCCGUGUGCAGCUGCACACUGGCCGGGAAGGAGACGU UGACCUGAACAGAGACCUCUGCCCGGCCCACAUCGUUCUCUGCC CAGCACGUCACGUUCUUCCUGUUGAGGUCACUGGUGACAUUGG CCAGGGUCAGCCCCAGGGAUGGCAGACCCCCAGAUUUCAUCACC GUGGCUGACUGCUCCAGCUCUGUGAGGAUCCAGCCGGCCUGCU CCAGGCCCCGCCCCUCCACCUGGCACCGCAGCAGCACGUCGUCCC CCACAUCCACCGAGGCAUUGGGCACCUGGACCUUCAGCGUGGGC ACACCACAGCUGGCAUUGGGCAUGUGGGCCAGGGGCCCUUGCC CAUGACACUGCAGCUUCUGUUCAGGCACUCCGCCCAGUCCCUCC UCCUCCCAGCGCUGUAGCCAGCGCAGGGCACAAGAACAGUGCAG AGGGUUCCCCGACAGGACCAGUUCCUGUAAGGAGAGGCCCUGC ACAGUUUUCCAGGAGAGAGACUCCAGAGCGUUGAAGGAGAGAU UCAGGCGACUGAGCCGAGGAGUGAAAUGGAAGGCAUCUGGCGC CACGAAACGGAGACCACUCUUCACGAUGGUGAGGUUUCUCAGC UCCCCCAGGCCCCUCAGAUCACGGAGCUCCAGAUGCUGCAGAUG CUGCUGGUUCUCGAUGUAGAGCUCAGUCAGGUUCUCUGCGCCG GGACCGGUUGAACGCGUGAAUUCCGACCAGAAGAUAUGGCUUC GGUUGGGUUCAAA

mRuby3-Fillerup8000nt-PP7	mRuby3, RNA size 8000nt, PP7	AUGGGAUCCGUGUCCAAGGGCGAAGAACUGAUCAAAGAAAACA UGCGGAUGAAGGUGGUCAUGGAAGGCAGCGUGAACGGCCACCA GUUCAAGUGUACAGGCGAAGGCGAGGGCAGACCUUAUGAGGGC GUGCAGACCAUGAGAAUCAAAGUGAUCGAAGGCGGCCCUCUGC CUUUCGCUUUCGACAUCCUGGCCACCAGCUUUAUGUACGGCAG CAGAACCUUCAUCAAGUACCCCGCUGACAUCCCCGAUUUCUUCA AGCAGAGCUUCCCCGAGGGCUUCACCUGGGAGAGAGUGACCAG AUACGAGGAUGGCGGCGUGGUCACAGUGACCCAGGACACAUCU CUGGAAGAUGGCGAGCUGGUGUACAACGUGAAAGUGCGGGGC GUGAACUUCCCCUCUAACGGCCCUGUGAUGCAGAAAAAGACCAA AGGCUGGGAGCCCAACACCGAGAUGAUGUACCCUGCUGAUGGC GGCCUGAGAGGCUACACAGAUAUCGCCCUGAAAGUGGACGGCG GAGGCCAUCUGCACUGCAACUUCGUGACCACCUACAGGUCCAAG AAAACCGUGGGCAACAUCAAGAUGCCUGGGGUGCACGCCGUGG ACCACAGACUGGAAAGAAUCGAGGAAAGCGACAACGAGACAUAC GUGGUGCAGCGCGAAGUGGCCGUGGCCAAGUACUCUAAUCUCG GAGGCGGCAUGGACGAGCUGUACAAAGGAUCUCUCCAGCUGCC ACCUCUGGAAAGACUGACCCUGCAGGCAGGCUACCCUUACGACG UGCCAGAUUACGCCUGAGGUACCCUUGUACAGCUCGUCCAUGC CGAGAGUGAUCCCGGCGGCGGUCACGAACUCCAGCAGGACCAUG UGAUCGCGCUUCUCGUUGGGGUCUUUGCUCAGGGCGGACUGG GUGCUCAGGUAGUGGUUGUCGGGCAGCAGCACGGGGCCGUCGC CGAUGGGGGUGUUCUGCUGGUAGUGGUCGGCGAGCUGCACGC UGCCGUCCUCGAUGUUGUGGCGGAUCUUGAAGUUCACCUUGA UGCCGUUCUUCUGCUUGUCGGCCAUGAUAUAGACGUUGUGGC UGUUGUAGUUGUACUCCAGCUUGUGCCCCAGGAUGUUGCCGU CCUCCUUGAAGUCGAUGCCCUUCAGCUCGAUGCGGUUCACCAG GGUGUCGCCCUCGAACUUCACCUCGGCGCGGGUCUUGUAGUUG CCGUCGUCCUUGAAGAAGAUGGUGCGCUCCUGGACGUAGCCUU CGGGCAUGGCGGACUUGAAGAAGUCGUGCUGCUUCAUGUGGU CGGGGUAGCGGCUGAAGCACUGCACGCCGUAGGUCAGGGUGGU CACGAGGGUGGGCCAGGGCACGGGCAGCUUGCCGGUGGUGCAG AUGAACUUCAGGGUCAGCUUGCCGUAGGUGGCAUCGCCCUCGC CCUCGCCGGACACGCUGAACUUGUGGCCGUUUACGUCGCCGUC CAGCUCGACCAGGAUGGGCACCACCCCGGUGAACAGCUCCUCGC CCUUGCUCACCAUUAAGGUACCUCUGGUGGGUAUAGAUUCUGU GUAAAAUUGAUUCCAAUGCCAUCCACUUGAUAGGCACUUUGCC UCCUUCUGCAUGGUAUUCUUUCUCUUCCGCACCCAGCAGUUUG GCCAGCCCAAAAUCUGUGAUCUUGACAUGCUGCGGUGUUUUCA CCAGUACGUUCCUGGCUGCCAGGUCGCGGUGCACCAAGCGACG GUCCUCCAAGUAGUUCAUGCCCUUUGCGAUCUGCACACACCAG UUGAGCAGGUACUGGGAGCCAAUAUUGUCUUUGUGUUCCCGG ACAUAGUCCAGGAGGCAGCCGAAGGGCAUGAGCUGCGUGAUGA GUUGCACGGUGGAGGUGAGGCAGAUGCCCAGCAGGCGGCACAC GUGGGGGUUGUCCACGCUGGCCAUCACGUAGGCUUCAUCGAGG AUUUCCUUGUUGGCUUUCGGAGAUGUUGCUUCUCUUAAUUCC UUGAUAGCGACGGGAAUUUUAACUUUCUCACCUUCUGGGAUCC AGAGUCCCUUAUACACCGUGCCGAACGCACCGGAGCCCAGCACU UUGAUCUUUUUGAAUUCAGUUUCCUUCAAGAUCCUCAAGAGA GCUUGGUUGGGAGCUUCUCCACUGGGUGUAAGAGGCUCCACAA GCUCCCUCUCCUGCAGCAGCCUCCGCAGCGUGCGCUUCCGAACG AUGUGGCGCCUUCGCAUGAAGAGGCCGAUCCCCAGGGCCACCAC CAGCAGCAAGAGGAGGGCCCCCACCAUCCCAGUGGCGAUGGACG

		GGAUCUUAGGCCCAUUCGUUGGACAGCCUUCAAGACCUGGCCC AGUGCAUCCGUAGGUGCAGUUUGGAUGGCACAGGUGGCACACA UGGCCGGCGUCUGCGUACUUCCAGACCAGGGUGUUGUUUUCUC CCAUGACUCCUGCCGGGCAGGUCUUGACGCAGUGGGGGCCGUC AAUGUAGUGGGCACACUGGAUACAGUUGUCUGGUCCCCGUCCU GUGCAGGUGAUGUUCAUGGCCUGAGGCAGGCACUCUGGGUGG CACUGUAUGCACUCAGAGUUCUCCACAAACUCCCUUGGCUCACC CUCCAGAAGGUUGCACUUGUCCACGCAUUCCCUGCCUCGGCUG ACAUUCCGGCAAGAGACGCAGUCCCUGGGCUCCGGGCCCCAGCA GCCCUCGGGGGAGCACAAGGCAUGGCAGACCUGGCCUGUGGCC UUGCAGCUGUUUUCACCUCUGUUGCUUAUAAUUUUGGUUUUC UGACCGGAGGUCCCAAACAGUUUUUUCCAGUUUAUUGUAUUU GCAUAGCACAAAUUUUUGUUUCCUGAAAUUAUCACAUCUCCAU CACUUAUCUCCUUGAGGGAGCGUAAUCCCAAGGAUGUUAUGUU CAGGCUGACGACUGCAAGAGAAAACUGACCAUGUUGCUUGGUC CUGCCGCGUAUGAUUUCUAGGUUCUCAAAGGCAUGGAGGUCCG UCCUGUUUUCAGGCCAAGCCUGAAUCAGCAAAAACCCUGUGAU UUCCUUUACGGUUUUCAGAAUAUCCAGUUCCUGUGGAUCCAGA GGAGGAGUAUGUGUGAAGGAGUCACCCCUAAAUGCCACCGGCA GGAUGUGGAGAUCGCCACUGAUGGAGGUGCAGUUUUUGAAGU GUUUAAUAUUCGUAGCAUUUAUGGAGAGUGAGUCUUUAAAUU CACCAAUACCUAUUCCGUUACACACUUUGCGGCAAGGCCCUUCG CACUUCUUACACUUGCGGACGCCGUCUUCCUCCAUCUCAUAGCU GUCGGCCCCACAGGCUCGGACGCACGAGCCGUGAUCUGUCACCA CAUAAUUACGGGGACACUUCUUCACGCAGGUGGCACCAAAGCU GUAUUUGCCCUCGGGGUUCACAUCCAUCUGGUACGUGGUGGG GUUGUAGAGCAUGAGUGGGGGGCAGGUGUCCUUGCACGUGGC UUCGUCUCGGAAUUUGCGGCAGACCAGGCAGUCGCUCUCCCGG GGGCCUGUGCAGCCUGCAGCACACUGGUUGUGGCAGCAGUCAC UGGGGGACUUGGUCGACCCUCCGUGUUGGAGAGCUGGUACCA GGGCUGCUUGCCGUAGGUGAAGAUCUCCCAGAGCACCACGCCG AAGCUCCACACGUCGCUCUCGGUGGUGAACUUACGGUACAGGA UGCUCUCGGGCGGCAUCCAGCGAAUGGGCAGCAUGGUGCGGCC UCCCACACGGUAAUAGUCGGUGCUGUAGAUAUCCCUGCUCAUG CCAAAAUCACCAAUCUUGACCACCAGUCCCUGGCCCACUAGACA GUUGCGUGUGGCCAGGUCCCGGUGCACAAAAUGCAGACCCGCC AGGUACACCAUCCCCGCAGCGACCUGGCUAGCCACGGCCAGCAG CUGCCCCAGACCCAGGGGGCCUGGAGCCACAUCCUCCCCACCAGC CAGCAGCUUGGCAUCAGGUCCAUGGGAUCGGAGGAAGCGGUUG AGGUCCCCGUGCCGCAUAUACUCAAAGACCAUGAGCAGGGGGC GGCCCUCGGUGCAGACGCCGAAGAAGCGCACGAUGUGCUGGUG CUGCAGCAUGGUGAGCAGCUCAGCCUCACGCUGGAAGUCCUGC CGAGCACUCUCGGACGCCUCCUUCAGUGCCUUGACAGCCACCAG CAUCUUGUCCUGCUCAGGCAGGAGGUUGUGGCACUCAGCAAGG AAGACCUUCCCAAAGGCGCCCUCCCCCAGCUCCCACUUGAGCACG AUGUCCCGGCGCUUGAUGUGGUGAACACAGGCAUCACUGAAGU AUUGUGGGUUCUCGAUGAUGUGGCCUUGGAGCCCAGAGCCUU UGCCCUCGGUGGGGGACAGGGAGCUGCCACCCAAUGUCAUGAA AUGCAGGGACAUGGCCAGCCCAUCCUCUGGAGCCAGCACAGCCG GGCGGUUGAUCCCAAACUUGUUUCUCCGUCCACAUUUGUUGAG CACAAGGAGCAGCGUAGAAAGGAAGAGGCAGGCAAAGACGGCC AGGCCCACAGCCACCGAGACCCCAAAAGGUGUUUCGUCCUUCUU CUCCACCGGGUCUCCAGAUGUGCUGUUAGUGUCCACCGGCGAG

		AAGGAGACAGGGAUGGGGUCCUCGGGGUUGAACUCGAAAGGG UUGUCCAUGAAGGCAGCCAUGAUGGAGGCGGAGGCCUGGCCGA AGGGGUUGGCAGCCAGCAGCGUGUAGUUGCCGUUGUUGACGU GGGUGGGCUGGUUGAGGCGCAGACACCCGUGCCGCACGGUCUC AUUGGCUGCCGGCUCCAGGAACUCAGUGAAGAUGAAGCUGGUC UCAUUGAGCACGGAGCCAUUGAAGAGCCAGCGCAGAGACGGUG CCGGCUGCCCAUCCACAGAGAAGGGGAUGCACCAGUGGUGCAUC UCCACCGCCGUGUGCAGCUGCACACUGGCCGGGAAGGAGACGU UGACCUGAACAGAGACCUCUGCCCGGCCCACAUCGUUCUCUGCC CAGCACGUCACGUUCUUCCUGUUGAGGUCACUGGUGACAUUGG CCAGGGUCAGCCCCAGGGAUGGCAGACCCCCAGAUUUCAUCACC GUGGCUGACUGCUCCAGCUCUGUGAGGAUCCAGCCGGCCUGCU CCAGGCCCCGCCCCUCCACCUGGCACCGCAGCAGCACGUCGUCCC CCACAUCCACCGAGGCAUUGGGCACCUGGACCUUCAGCGUGGGC ACACCACAGCUGGCAUUGGGCAUGUGGGCCAGGGGCCCUUGCC CAUGACACUGCAGCUUCUGUUCAGGCACUCCGCCCAGUCCCUCC UCCUCCCAGCGCUGUAGCCAGCGCAGGGCACAAGAACAGUGCAG AGGGUUCCCCGACAGGACCAGUUCCUGUAAGGAGAGGCCCUGC ACAGUUUUCCAGGAGAGAGACUCCAGAGCGUUGAAGGAGAGAU UCAGGCGACUGAGCCGAGGAGUGAAAUGGAAGGCAUCUGGCGC CACGAAACGGAGACCACUCUUCACGAUGGUGAGGUUUCUCAGC UCCCCCAGGCCCCUCAGAUCACGGAGCUCCAGAUGCUGCAGAUG CUGCUGGUUCUCGAUGUAGAGCUCAGUCAGGUUCUCUGCGCCG GGACCGGUGUCCAGCAUGGGCACAUAGUCCACCGACUCGUCCU UGCUCAUGUCCAUGUAGCCACCGUCGCUCUCCCCGGUCAAGGAC ACAUGGCUGGGCAGGGGGAGCCCAACGGGCAGAGCAUUGCUGU AGAGCUCCGCGCUGGGCGGGCGGCGCUUGUCGGAGUGGUGCU GCAGGAAGGUGUGUUUGUUGCGGUGCAGGUAGUCCACCAGGU CUCCGUAGCGGCAGUACUCAGUGAUGAUAUAGAUGGGUCCUCC UUUGGUGCAGGCCCCCAACAGGUUGACCACGUUCAGGUGGGGC CCAAGGUGACUCAUGAUCUUCAGCUCCGACAUAAGGGCUUGCU UCUCACUGCUGCGGGCUGUGGAUUUAAGCAUCUUGACGGCCAC UUUCAUCGUGGCCUGAGAAUGGCUCAGGCCAUGAGCCGUGGCC UCCACCACCUGCCCAAAGGCCCCAGAGCCGAGGGUGCGUCCCAG CACAAGCUGGUCCCGCGGCAGCUCCCACGUGGAGUCAUAGGGCA GCUGCAUGGGGUCCACGUAGAUGUACUCAUGGCCGUCAGAGCU CACAGACUCAAUCACCUUCCAUCGGAUCUCGUAACGUGGCUUCU UCUGCCAAAGCAUGAUGAGGAUGAUAAGGGAGAUGAUGGUGA GCACCACCAGGGCCAGGAUGGCUGAGAUCACCACCACCUUAAAG GGCAAGGAGUGUGGCACCACGAUGACCUCCUGCGUGUCCUGGC CCACAGCGUUGCGCAGCGUGCAGCGCACCGACAGUGGCCGAUCC ACGUGCUGCAGACGCAGUGUGCUCACCACCUCAAACUCCUGCUC CUCCUCCCAGUACGUCACGUUAGUCUCCAGCUGGCUCUCCUCUU CGGAACUGUUCCCCAGCAGCGUGGGCGGCAGCUCACGUGGACA CCUUUUGAGGUCUCUGCAGGCAGACCAGAUGAUGUUCGGCUGG GGCAUGCCCCGGCCACGACAGCGGACUGUCUGUUCCCCACUGUC AGGGUGGCUCUCACUUAGCUCCAGCACUCGGACAGGGACAUUG AUCUGUAGCUGGAAGGAGAGCUGGACCUCAGCAUCCUCAUGGA AGGCCCGCAUGGUGUAGUGGCCAGCCUCUGCCACCUUCACGCGA ACCAGUGUCAGCUCUGACACAUACCGGGUCUCCGACACGUUGCG CGUGGACAGGGCGAUUUCGCCAGCGCUGGAGUCGCCCAGGGUG CGGUUGUCUUUGAACCACAGGACAGUGGGCGGUGGGUAGGCC UCGAACACUACCUGCAGUGUCCGGCUCCGAUGCAGCUCAGCAAA

		UUGUAGUGUGCCCACCUCUCCCAGGAGCCGCACGUAGCCGCUCU CAACCACGGUGAUGUUGAUGGCCUUUUCAUCCUGAUGGUCAUU CACACUCUCCGUCACAUUGCAGGUGUAGGUCCCCGAGUCUUCU AACUCGGCACUGGGGAUGUGCAGGAUGGAGCGGAUGUGGUAA GGCAUAUCCAAGAGGAAGUCAGUCACCGGCUCCACCAGCCGCCC ACUUUCUUUGCGGGGGUAUGUCCACUCGAAGUUGACCACCUCA UUCCCGAUCACAAUGCACAUGAGGGUGAUGUUCUCACCCUGGC GGACCACAGUCUGCACUGCGUUCACAGAGACGUUGAUGGAUGA CACCUGGAGUCUGUAGACAUAGUAGGCAUCAGAAUCCACCUCCC UGUCCCCAAUGGUGGUUUUGCAGAUGUAGCUUCUGUCCUCAAA GAUACCACUAAAGCCACGUUGGUGAUCAUAGGGGACAGGCAGU GCAACGUCCCCUUUCUUCUCGUGCAGUGUCACCACCAGCUGUG GGUCUGUUACUCGGCAUGGAAUGGUGAUCUCAGUUAUUUCCG UGAGAAAGAUGAAUAGUUCCUCGGCAUCAUUAGGGAGGAAGCC CACGGUGGGAUCUGGCACAAAGAUGUAGAGCCGUUUCCGCUCA UCGGUCUCCAGUCCACGGGAGUCAUUGUGGGUGCAAAAGUAUU CUCCCGUGUCUAGCCCAGUGAGGUUGGUCAGUGUGAGCACGCU GGAGAAGGUGCCAUCCUGGGCCUUGGCUGAACGCGUGAAUUCC GACCAGAAGAUAUGGCUUCGGUUGGGUUCAAA

mRuby3-Fillerup10000nt-PP7	mRuby3, RNA size 10000nt, PP7	AUGGGAUCCGUGUCCAAGGGCGAAGAACUGAUCAAAGAAAACA UGCGGAUGAAGGUGGUCAUGGAAGGCAGCGUGAACGGCCACCA GUUCAAGUGUACAGGCGAAGGCGAGGGCAGACCUUAUGAGGGC GUGCAGACCAUGAGAAUCAAAGUGAUCGAAGGCGGCCCUCUGC CUUUCGCUUUCGACAUCCUGGCCACCAGCUUUAUGUACGGCAG CAGAACCUUCAUCAAGUACCCCGCUGACAUCCCCGAUUUCUUCA AGCAGAGCUUCCCCGAGGGCUUCACCUGGGAGAGAGUGACCAG AUACGAGGAUGGCGGCGUGGUCACAGUGACCCAGGACACAUCU CUGGAAGAUGGCGAGCUGGUGUACAACGUGAAAGUGCGGGGC GUGAACUUCCCCUCUAACGGCCCUGUGAUGCAGAAAAAGACCAA AGGCUGGGAGCCCAACACCGAGAUGAUGUACCCUGCUGAUGGC GGCCUGAGAGGCUACACAGAUAUCGCCCUGAAAGUGGACGGCG GAGGCCAUCUGCACUGCAACUUCGUGACCACCUACAGGUCCAAG AAAACCGUGGGCAACAUCAAGAUGCCUGGGGUGCACGCCGUGG ACCACAGACUGGAAAGAAUCGAGGAAAGCGACAACGAGACAUAC GUGGUGCAGCGCGAAGUGGCCGUGGCCAAGUACUCUAAUCUCG GAGGCGGCAUGGACGAGCUGUACAAAGGAUCUCUCCAGCUGCC ACCUCUGGAAAGACUGACCCUGCAGGCAGGCUACCCUUACGACG UGCCAGAUUACGCCUGAGGUACCCUUGUACAGCUCGUCCAUGC CGAGAGUGAUCCCGGCGGCGGUCACGAACUCCAGCAGGACCAUG UGAUCGCGCUUCUCGUUGGGGUCUUUGCUCAGGGCGGACUGG GUGCUCAGGUAGUGGUUGUCGGGCAGCAGCACGGGGCCGUCGC CGAUGGGGGUGUUCUGCUGGUAGUGGUCGGCGAGCUGCACGC UGCCGUCCUCGAUGUUGUGGCGGAUCUUGAAGUUCACCUUGA UGCCGUUCUUCUGCUUGUCGGCCAUGAUAUAGACGUUGUGGC UGUUGUAGUUGUACUCCAGCUUGUGCCCCAGGAUGUUGCCGU CCUCCUUGAAGUCGAUGCCCUUCAGCUCGAUGCGGUUCACCAG GGUGUCGCCCUCGAACUUCACCUCGGCGCGGGUCUUGUAGUUG CCGUCGUCCUUGAAGAAGAUGGUGCGCUCCUGGACGUAGCCUU CGGGCAUGGCGGACUUGAAGAAGUCGUGCUGCUUCAUGUGGU CGGGGUAGCGGCUGAAGCACUGCACGCCGUAGGUCAGGGUGGU CACGAGGGUGGGCCAGGGCACGGGCAGCUUGCCGGUGGUGCAG AUGAACUUCAGGGUCAGCUUGCCGUAGGUGGCAUCGCCCUCGC CCUCGCCGGACACGCUGAACUUGUGGCCGUUUACGUCGCCGUC CAGCUCGACCAGGAUGGGCACCACCCCGGUGAACAGCUCCUCGC CCUUGCUCACCAUUAAGGUACCUCUGGUGGGUAUAGAUUCUGU GUAAAAUUGAUUCCAAUGCCAUCCACUUGAUAGGCACUUUGCC UCCUUCUGCAUGGUAUUCUUUCUCUUCCGCACCCAGCAGUUUG GCCAGCCCAAAAUCUGUGAUCUUGACAUGCUGCGGUGUUUUCA CCAGUACGUUCCUGGCUGCCAGGUCGCGGUGCACCAAGCGACG GUCCUCCAAGUAGUUCAUGCCCUUUGCGAUCUGCACACACCAG UUGAGCAGGUACUGGGAGCCAAUAUUGUCUUUGUGUUCCCGG ACAUAGUCCAGGAGGCAGCCGAAGGGCAUGAGCUGCGUGAUGA GUUGCACGGUGGAGGUGAGGCAGAUGCCCAGCAGGCGGCACAC GUGGGGGUUGUCCACGCUGGCCAUCACGUAGGCUUCAUCGAGG AUUUCCUUGUUGGCUUUCGGAGAUGUUGCUUCUCUUAAUUCC UUGAUAGCGACGGGAAUUUUAACUUUCUCACCUUCUGGGAUCC AGAGUCCCUUAUACACCGUGCCGAACGCACCGGAGCCCAGCACU UUGAUCUUUUUGAAUUCAGUUUCCUUCAAGAUCCUCAAGAGA GCUUGGUUGGGAGCUUCUCCACUGGGUGUAAGAGGCUCCACAA GCUCCCUCUCCUGCAGCAGCCUCCGCAGCGUGCGCUUCCGAACG AUGUGGCGCCUUCGCAUGAAGAGGCCGAUCCCCAGGGCCACCAC CAGCAGCAAGAGGAGGGCCCCCACCAUCCCAGUGGCGAUGGACG

		GGAUCUUAGGCCCAUUCGUUGGACAGCCUUCAAGACCUGGCCC AGUGCAUCCGUAGGUGCAGUUUGGAUGGCACAGGUGGCACACA UGGCCGGCGUCUGCGUACUUCCAGACCAGGGUGUUGUUUUCUC CCAUGACUCCUGCCGGGCAGGUCUUGACGCAGUGGGGGCCGUC AAUGUAGUGGGCACACUGGAUACAGUUGUCUGGUCCCCGUCCU GUGCAGGUGAUGUUCAUGGCCUGAGGCAGGCACUCUGGGUGG CACUGUAUGCACUCAGAGUUCUCCACAAACUCCCUUGGCUCACC CUCCAGAAGGUUGCACUUGUCCACGCAUUCCCUGCCUCGGCUG ACAUUCCGGCAAGAGACGCAGUCCCUGGGCUCCGGGCCCCAGCA GCCCUCGGGGGAGCACAAGGCAUGGCAGACCUGGCCUGUGGCC UUGCAGCUGUUUUCACCUCUGUUGCUUAUAAUUUUGGUUUUC UGACCGGAGGUCCCAAACAGUUUUUUCCAGUUUAUUGUAUUU GCAUAGCACAAAUUUUUGUUUCCUGAAAUUAUCACAUCUCCAU CACUUAUCUCCUUGAGGGAGCGUAAUCCCAAGGAUGUUAUGUU CAGGCUGACGACUGCAAGAGAAAACUGACCAUGUUGCUUGGUC CUGCCGCGUAUGAUUUCUAGGUUCUCAAAGGCAUGGAGGUCCG UCCUGUUUUCAGGCCAAGCCUGAAUCAGCAAAAACCCUGUGAU UUCCUUUACGGUUUUCAGAAUAUCCAGUUCCUGUGGAUCCAGA GGAGGAGUAUGUGUGAAGGAGUCACCCCUAAAUGCCACCGGCA GGAUGUGGAGAUCGCCACUGAUGGAGGUGCAGUUUUUGAAGU GUUUAAUAUUCGUAGCAUUUAUGGAGAGUGAGUCUUUAAAUU CACCAAUACCUAUUCCGUUACACACUUUGCGGCAAGGCCCUUCG CACUUCUUACACUUGCGGACGCCGUCUUCCUCCAUCUCAUAGCU GUCGGCCCCACAGGCUCGGACGCACGAGCCGUGAUCUGUCACCA CAUAAUUACGGGGACACUUCUUCACGCAGGUGGCACCAAAGCU GUAUUUGCCCUCGGGGUUCACAUCCAUCUGGUACGUGGUGGG GUUGUAGAGCAUGAGUGGGGGGCAGGUGUCCUUGCACGUGGC UUCGUCUCGGAAUUUGCGGCAGACCAGGCAGUCGCUCUCCCGG GGGCCUGUGCAGCCUGCAGCACACUGGUUGUGGCAGCAGUCAC UGGGGGACUUGGUCGACCCUCCGUGUUGGAGAGCUGGUACCA GGGCUGCUUGCCGUAGGUGAAGAUCUCCCAGAGCACCACGCCG AAGCUCCACACGUCGCUCUCGGUGGUGAACUUACGGUACAGGA UGCUCUCGGGCGGCAUCCAGCGAAUGGGCAGCAUGGUGCGGCC UCCCACACGGUAAUAGUCGGUGCUGUAGAUAUCCCUGCUCAUG CCAAAAUCACCAAUCUUGACCACCAGUCCCUGGCCCACUAGACA GUUGCGUGUGGCCAGGUCCCGGUGCACAAAAUGCAGACCCGCC AGGUACACCAUCCCCGCAGCGACCUGGCUAGCCACGGCCAGCAG CUGCCCCAGACCCAGGGGGCCUGGAGCCACAUCCUCCCCACCAGC CAGCAGCUUGGCAUCAGGUCCAUGGGAUCGGAGGAAGCGGUUG AGGUCCCCGUGCCGCAUAUACUCAAAGACCAUGAGCAGGGGGC GGCCCUCGGUGCAGACGCCGAAGAAGCGCACGAUGUGCUGGUG CUGCAGCAUGGUGAGCAGCUCAGCCUCACGCUGGAAGUCCUGC CGAGCACUCUCGGACGCCUCCUUCAGUGCCUUGACAGCCACCAG CAUCUUGUCCUGCUCAGGCAGGAGGUUGUGGCACUCAGCAAGG AAGACCUUCCCAAAGGCGCCCUCCCCCAGCUCCCACUUGAGCACG AUGUCCCGGCGCUUGAUGUGGUGAACACAGGCAUCACUGAAGU AUUGUGGGUUCUCGAUGAUGUGGCCUUGGAGCCCAGAGCCUU UGCCCUCGGUGGGGGACAGGGAGCUGCCACCCAAUGUCAUGAA AUGCAGGGACAUGGCCAGCCCAUCCUCUGGAGCCAGCACAGCCG GGCGGUUGAUCCCAAACUUGUUUCUCCGUCCACAUUUGUUGAG CACAAGGAGCAGCGUAGAAAGGAAGAGGCAGGCAAAGACGGCC AGGCCCACAGCCACCGAGACCCCAAAAGGUGUUUCGUCCUUCUU CUCCACCGGGUCUCCAGAUGUGCUGUUAGUGUCCACCGGCGAG

		AAGGAGACAGGGAUGGGGUCCUCGGGGUUGAACUCGAAAGGG UUGUCCAUGAAGGCAGCCAUGAUGGAGGCGGAGGCCUGGCCGA AGGGGUUGGCAGCCAGCAGCGUGUAGUUGCCGUUGUUGACGU GGGUGGGCUGGUUGAGGCGCAGACACCCGUGCCGCACGGUCUC AUUGGCUGCCGGCUCCAGGAACUCAGUGAAGAUGAAGCUGGUC UCAUUGAGCACGGAGCCAUUGAAGAGCCAGCGCAGAGACGGUG CCGGCUGCCCAUCCACAGAGAAGGGGAUGCACCAGUGGUGCAUC UCCACCGCCGUGUGCAGCUGCACACUGGCCGGGAAGGAGACGU UGACCUGAACAGAGACCUCUGCCCGGCCCACAUCGUUCUCUGCC CAGCACGUCACGUUCUUCCUGUUGAGGUCACUGGUGACAUUGG CCAGGGUCAGCCCCAGGGAUGGCAGACCCCCAGAUUUCAUCACC GUGGCUGACUGCUCCAGCUCUGUGAGGAUCCAGCCGGCCUGCU CCAGGCCCCGCCCCUCCACCUGGCACCGCAGCAGCACGUCGUCCC CCACAUCCACCGAGGCAUUGGGCACCUGGACCUUCAGCGUGGGC ACACCACAGCUGGCAUUGGGCAUGUGGGCCAGGGGCCCUUGCC CAUGACACUGCAGCUUCUGUUCAGGCACUCCGCCCAGUCCCUCC UCCUCCCAGCGCUGUAGCCAGCGCAGGGCACAAGAACAGUGCAG AGGGUUCCCCGACAGGACCAGUUCCUGUAAGGAGAGGCCCUGC ACAGUUUUCCAGGAGAGAGACUCCAGAGCGUUGAAGGAGAGAU UCAGGCGACUGAGCCGAGGAGUGAAAUGGAAGGCAUCUGGCGC CACGAAACGGAGACCACUCUUCACGAUGGUGAGGUUUCUCAGC UCCCCCAGGCCCCUCAGAUCACGGAGCUCCAGAUGCUGCAGAUG CUGCUGGUUCUCGAUGUAGAGCUCAGUCAGGUUCUCUGCGCCG GGACCGGUGUCCAGCAUGGGCACAUAGUCCACCGACUCGUCCU UGCUCAUGUCCAUGUAGCCACCGUCGCUCUCCCCGGUCAAGGAC ACAUGGCUGGGCAGGGGGAGCCCAACGGGCAGAGCAUUGCUGU AGAGCUCCGCGCUGGGCGGGCGGCGCUUGUCGGAGUGGUGCU GCAGGAAGGUGUGUUUGUUGCGGUGCAGGUAGUCCACCAGGU CUCCGUAGCGGCAGUACUCAGUGAUGAUAUAGAUGGGUCCUCC UUUGGUGCAGGCCCCCAACAGGUUGACCACGUUCAGGUGGGGC CCAAGGUGACUCAUGAUCUUCAGCUCCGACAUAAGGGCUUGCU UCUCACUGCUGCGGGCUGUGGAUUUAAGCAUCUUGACGGCCAC UUUCAUCGUGGCCUGAGAAUGGCUCAGGCCAUGAGCCGUGGCC UCCACCACCUGCCCAAAGGCCCCAGAGCCGAGGGUGCGUCCCAG CACAAGCUGGUCCCGCGGCAGCUCCCACGUGGAGUCAUAGGGCA GCUGCAUGGGGUCCACGUAGAUGUACUCAUGGCCGUCAGAGCU CACAGACUCAAUCACCUUCCAUCGGAUCUCGUAACGUGGCUUCU UCUGCCAAAGCAUGAUGAGGAUGAUAAGGGAGAUGAUGGUGA GCACCACCAGGGCCAGGAUGGCUGAGAUCACCACCACCUUAAAG GGCAAGGAGUGUGGCACCACGAUGACCUCCUGCGUGUCCUGGC CCACAGCGUUGCGCAGCGUGCAGCGCACCGACAGUGGCCGAUCC ACGUGCUGCAGACGCAGUGUGCUCACCACCUCAAACUCCUGCUC CUCCUCCCAGUACGUCACGUUAGUCUCCAGCUGGCUCUCCUCUU CGGAACUGUUCCCCAGCAGCGUGGGCGGCAGCUCACGUGGACA CCUUUUGAGGUCUCUGCAGGCAGACCAGAUGAUGUUCGGCUGG GGCAUGCCCCGGCCACGACAGCGGACUGUCUGUUCCCCACUGUC AGGGUGGCUCUCACUUAGCUCCAGCACUCGGACAGGGACAUUG AUCUGUAGCUGGAAGGAGAGCUGGACCUCAGCAUCCUCAUGGA AGGCCCGCAUGGUGUAGUGGCCAGCCUCUGCCACCUUCACGCGA ACCAGUGUCAGCUCUGACACAUACCGGGUCUCCGACACGUUGCG CGUGGACAGGGCGAUUUCGCCAGCGCUGGAGUCGCCCAGGGUG CGGUUGUCUUUGAACCACAGGACAGUGGGCGGUGGGUAGGCC UCGAACACUACCUGCAGUGUCCGGCUCCGAUGCAGCUCAGCAAA

		UUGUAGUGUGCCCACCUCUCCCAGGAGCCGCACGUAGCCGCUCU CAACCACGGUGAUGUUGAUGGCCUUUUCAUCCUGAUGGUCAUU CACACUCUCCGUCACAUUGCAGGUGUAGGUCCCCGAGUCUUCU AACUCGGCACUGGGGAUGUGCAGGAUGGAGCGGAUGUGGUAA GGCAUAUCCAAGAGGAAGUCAGUCACCGGCUCCACCAGCCGCCC ACUUUCUUUGCGGGGGUAUGUCCACUCGAAGUUGACCACCUCA UUCCCGAUCACAAUGCACAUGAGGGUGAUGUUCUCACCCUGGC GGACCACAGUCUGCACUGCGUUCACAGAGACGUUGAUGGAUGA CACCUGGAGUCUGUAGACAUAGUAGGCAUCAGAAUCCACCUCCC UGUCCCCAAUGGUGGUUUUGCAGAUGUAGCUUCUGUCCUCAAA GAUACCACUAAAGCCACGUUGGUGAUCAUAGGGGACAGGCAGU GCAACGUCCCCUUUCUUCUCGUGCAGUGUCACCACCAGCUGUG GGUCUGUUACUCGGCAUGGAAUGGUGAUCUCAGUUAUUUCCG UGAGAAAGAUGAAUAGUUCCUCGGCAUCAUUAGGGAGGAAGCC CACGGUGGGAUCUGGCACAAAGAUGUAGAGCCGUUUCCGCUCA UCGGUCUCCAGUCCACGGGAGUCAUUGUGGGUGCAAAAGUAUU CUCCCGUGUCUAGCCCAGUGAGGUUGGUCAGUGUGAGCACGCU GGAGAAGGUGCCAUCCUGGGCCUUGGCUGACGAUCGAUCGGAU GCAUUUACACUCGAGUCAGUCAGUCAACGUAUCACCUGGUGCU CCAGGUGCCCAUGCGGCCCCCUCCUCCCCAGGCUGGGUCUGGCC CAUCGGGAUUAUCCAUGUUCUCAUAAGAGUCUGCAUCUUCCUC AUGAUUGGGUCCAGGCUGGCCCCGAAUGGAGCGGAGCUGGGG GGCUGCAUACAGGAUUCCUCUCAUAUCCUCAUAGGACUGGGAC CCCAGGGAGGUUGCUUCCCGGCUGGGGUCCCAGGCUGACCCAU GAGGGCUCAGGAAGUCCAUUGUCCUGGCGACCGGCUGGGUCAG CUCUUCAUCCUCGUUCUCAUAAGACUCAGCGUUGGAGAAGGAG UCUUCAUCCUCAGGACCCAGGGGCUCAUCCUCAGGGUUCUCGU AGCCGCUGCCAUCCUGGGAGAGCUGGUCCUGCCCAAGGUUGGA GUCGUUCUCAUAGAACUCGGAGUCCUCCUCACUGUCAGGUUCC UCAUAGCCCUCCCCUUCCUCUUCUUCUGGGCCCACUCCCGGCGG GCUCCGGGACCCCAAGGCUCCAUCCGCCUGGACGUCGCUGCUCG GGUUUCCAUAAGACGGGGCAGUGCCCCCCAGGCCUGCGGCCCAA CGCUGGGCGCGUCCGAGGCCUGAGGUGGGUGUGGGGAGAGAC AGCACGUUCCCGUACUGGUUCUGGGGCCCGCUUCCUGGGGGAG GCGUCACUUUGAAGAAUCUCCUGGUGGGGUCAGUCAUUCGCUU UCUUUUCCUCCUCAGGACCAGGGCUCUUUGAAGAUGAAGAAUG CCCACAAGGGAACACAGGCAGAAGAUCAGAUAAGCCAAAGUCAC AGCUGAGACCUUCCAGCCACCAGUCCUCAGCAGCCAGUGCCAUA GUACUGGCCGAGCAGUGAUCUCCAGGUGGAAUGACAUGGUCAG GUUGCCACGGUGACAAUAAUACUUUCCAGCGUCUUGAGCUGUG GCCCGGGGCAACAACAGACCCGUCUCCAUUACCCACAUAUCUCU GGCCGGGCGAUCGUCCUUCAGCUCUAGGCUCAGCAAUGACUUA GGCCCCUUGGGGUGCACAUGGGUCCAGGAGAGGGGGCCCCUGG ACACAGAGUCAGGGGGUACCCCACAGGACAGCCAGAGUGUGGA GCCAGGGGCCAUGGUGAGGUCCUGGCUGAGGCUCUGGUUCAG GCUGUCCCUCGGUGGGAGACACGGAGGCUCUCCCUCCCAGAUC UCAGGGCGGUCUUUGGCCCACACAUACAGCUUGGGGCUCAUGA GCUUCCCGGAAGGGGAGCUGGGGCCCUCUGAGGACCUGUUCUU CAGGCCACAGCCCAGGCCACCUAGGUCCGAAACAUUCCACCGGA ACAGCUCCCCGCUGCCCUCCACAUUGACUGUCCAGCCAGGCUGC CAGGCCUUCUCAGAGGGGGGCCCCGGCUGGCACAGGUAGAAGC CCCCCAUCUGUUGAGAGACGUUGAAGAUGAAAAGCCAGAUGGC CAGGGGCCUCAUGUGGAUUCCCAGGCCUGGCAGCCCCAGGCUG

		AGUUUUAAGAAGGGUUUAAGCGGGGACUCCCGAGACCAGGUCA GCUGCUGAGUGGGGCCAUCUGAGGUCCCCUUGAGGCACUGCAG CACAGCGUUAUCUCCCUCUUCCACCUUCACCACUAGAGGUUCCU CGGGCCUGACUUCCAUGGGGGUGAGGAAGAGGAGGAAGAAGA GGAGGCGAGGAGGUGGCAUAAGCUUUUAAACGCGUGAAUUCC GACCAGAAGAUAUGGCUUCGGUUGGGUUCAAA
Wildtype VSV-G	Wildtype Vesicular Stomatitis Virus (VSV) Glycoprotein (VSV-G)	MKCLLYLAFLFIGVNCKFTIVFPHNQKGNWKNVPSNYHYCPSSSDLN WHNDLIGTALQVKMPKSHKAIQADGWMCHASKWVTTCDFRWYGP KYITHSIRSFTPSVEQCKESIEQTKQGTWLNPGFPPQSCGYATVTDAEA VIVQVTPHHVLVDEYTGEWVDSQFINGKCSNYICPTVHNSTTWHSDY KVKGLCDSNLISMDITFFSEDGELSSLGKEGTGFRSNYFAYETGGKACK MQYCKHWGVRLPSGVWFEMADKDLFAAARFPECPEGSSISAPSQTS VDVSLIQDVERILDYSLCQETWSKIRAGLPISPVDLSYLAPKNPGTGPAF TIINGTLKYFETRYIRVDIAAPILSRMVGMISGTTTERELWDDWAPYED VEIGPNGVLRTSSGYKFPLYMIGHGMLDSDLHLSSKAQVFEHPHIQDA ASQLPDDESLFFGDTGLSKNPIELVEGWFSSWKSSIASFFFIIGLIIGLFLV LRVGIHLCIKLKHTKKRQIYTDIEMNRLGK

exemplary AAVS1 donor	Used for stable integration of EGFR and IL7Ra in HEK293T (Red: 5' and 3' Homology Arms; Dark Blue: CAG Promoter; Green: **Start-to-stop codon for gene-of-interest**; Yellow: Internal Ribosomal Entry Site (IRES); Light Blue: Puromycin Resistance Gene	CTTTGAGCTCTACTGGCTTCTGCGCCGCCTCTGGCCCACTGTTTCCC CTTCCCAGGCAGGTCCTGCTTTCTCTGACCTGCATTCTCTCCCCTGG GCCTGTGCCGCTTTCTGTCTGCAGCTTGTGGCCTGGGTCACCTCTAC GGCTGGCCCAGATCCTTCCCTGCCGCCTCCTTCAGGTTCCGTCTTCC TCCACTCCCTCTTCCCCTTGCTCTCTGCTGTGTTGCTGCCCAAGGATG CTCTTTCCGGAGCACTTCCTTCTCGGCGCTGCACCACGTGATGTCCT CTGAGCGGATCCTCCCCGTGTCTGGGTCCTCTCCGGGCATCTCTCCT CCCTCACCCAACCCCATGCCGTCTTCACTCGCTGGGTTCCCTTTTCCT TCTCCTTCTGGGGCCTGTGCCATCTCTCGTTTCTTAGGATGGCCTTCT CCGACGGATGTCTCCCTTGCGTCCCGCCTCCCCTTCTTGTAGGCCTG CATCATCACCGTTTTTCTGGACAACCCCAAAGTACCCCGTCTCCCTG GCTTTAGCCACCTCTCCATCCTCTTGCTTTCTTTGCCTGGACACCCCG TTCTCCTGTGGATTCGGGTCACCTCTCACTCCTTTCATTTGGGCAGC TCCCCTACCCCCCTTACCTCTCTAGTCTGTGCTAGCTCTTCCAGCCCC CTGTCATGGCATCTTCCAGGGGTCCGAGAGCTCAGCTAGTCTTCTTC CTCCAACCCGGGCCCCTATGTCCACTTCAGGACAGCATGTTTGCTGC CTCCAGGGATCCTGTGTCCCCGAGCTGGGACCACCTTATATTCGCG GCCCGCGCCGGATTCGACATTGATTATTGACTAGTTATTAATAGTA ATCAATTACGGGGTCATTAGTTCATAGCCCATATATGGAGTTCCGC GTTACATAACTTACGGTAAATGGCCCGCCTGGCTGACCGCCCAACG ACCCCCGCCCATTGACGTCAATAATGACGTATGTTCCCATAGTAACG CCAATAGGGACTTTCCATTGACGTCAATGGGTGGAGTATTTACGGT AAACTGCCCACTTGGCAGTACATCAAGTGTATCATATGCCAAGTAC GCCCCCTATTGACGTCAATGACGGTAAATGGCCCGCCTGGCATTAT GCCCAGTACATGACCTTATGGGACTTTCCTACTTGGCAGTACATCTA CGTATTAGTCATCGCTATTACCATGGTCGAGGTGAGCCCCACGTTCT GCTTCACTCTCCCCATCTCCCCCCCCTCCCCACCCCCAATTTTGTATTT ATTTATTTTTTTAATTATTTTGTGCAGCGATGGGGGCGGGGGGGGGG GGGGGGCGCGCGCCAGGCGGGGCGGGGCGGGGCGAGGGGCGG GGCGGGGCGAGGCGGAGAGGTGCGGCGGCAGCCAATCAGAGCG GCGCGCTCCGAAAGTTTCCTTTTATGGCGAGGCGGCGGCGGCGGC GGCCCTATAAAAAGCGAAGCGCGCGGCGGGCGGGAGTCGCTGCG TCGCGCCTTCGCCCCGTGCCCCGCTCCGCCGCCGCCTCGCGCCGCC CGCCCCGGCTCTGACTGACCGCGTTACTCCCACAGGTGAGCGGGC GGGACGGCCCTTCTCCTCCGGGCTGTAATTAGCGCTTGGTTTAATG ACGGCTCGTTTCTTTTCTGTGGCTGCGTGAAAGCCTTAAAGGGCTC CGGGAGGGCCCTTTGTGCGGGGGGGAGCGGCTCGGGGGGTGCGT GCGTGTGTGTGTGCGTGGGGAGCGCCGCGTGCGGCCCGCGCTGCC CGGCGGCTGTGAGCGCTGCGGGCGCGGCGCGGGGCTTTGTGCGCT CCGCGTGTGCGCGAGGGGAGCGCGGCCGGGGGCGGTGCCCCGCG GTGCGGGGGGGCTGCGAGGGGAACAAAGGCTGCGTGCGGGGTGT GTGCGTGGGGGGGTGAGCAGGGGGTGTGGGCGCGGCGGTCGGG CTGTAACCCCCCCCTGCACCCCCCTCCCCGAGTTGCTGAGCACGGCC CGGCTTCGGGTGCGGGGCTCCGTGCGGGGCGTGGCGCGGGGCTC GCCGTGCCGGGCGGGGGGTGGCGGCAGGTGGGGGTGCCGGGCG GGGCGGGGCCGCCTCGGGCCGGGGAGGGCTCGGGGGAGGGGCG CGGCGGCCCCGGAGCGCCGGCGGCTGTCGAGGCGCGGCGAGCCG CAGCCATTGCCTTTTATGGTAATCGTGCGAGAGGGCGCAGGGACTT CCTTTGTCCCAAATCTGGCGGAGCCGAAATCTGGGAGGCGCCGCC GCACCCCCTCTAGCGGGCGCGGGCGAAGCGGTGCGGCGCCGGCA GGAAGGAAATGGGCGGGGAGGGCCTTCGTGCGTCGCCGCGCCGC CGTCCCCTTCTCCATCTCCAGCCTCGGGGCTGCCGCAGGGGGACGG CTGCCTTCGGGGGGGACGGGGCAGGGCGGGGTTCGGCTTCTGGC

		GTGTGACCGGCGGCTCTAGAGCCTCTGCTAACCATGTTCATGCCTT CTTCTTTTTCCTACAGATCCTTAATTAAGCCGCCACC**ATGNNNNNN** **NNNTAA**ACGCGTTGTACACCCCCCTCTCCCTCCCCCCCCCCTAACGT TACTGGCCGAAGCCGCTTGGAATAAGGCCGGTGTGCGTTTGTCTAT ATGTTATTTTCCACCATATTGCCGTCTTTTGGCAATGTGAGGGCCCG GAAACCTGGCCCTGTCTTCTTGACGAGCATTCCTAGGGGTCTTTCCC CTCTCGCCAAAGGAATGCAAGGTCTGTTGAATGTCGTGAAGGAAG CAGTTCCTCTGGAAGCTTCTTGAAGACAAACAACGTCTGTAGCGAC CCTTTGCAGGCAGCGGAACCCCCCACCTGGCGACAGGTGCCTCTGC GGCCAAAAGCCACGTGTATAAGATACACCTGCAAAGGCGGCACAA CCCCAGTGCCACGTTGTGAGTTGGATAGTTGTGGAAAGAGTCAAAT GGCTCTCCTCAAGCGTATTCAACAAGGGGCTGAAGGATGCCCAGA AGGTACCCCATTGTATGGGATCTGATCTGGGGCCTCGGTGCACATG CTTTACATGTGTTTAGTCGAGGTTAAAAAACGTCTAGGCCCCCCGA ACCACGGGGACGTGGTTTTCCTTTGAAAAACACGATGATAATATGG CCACCACCATGACCGAGTACAAGCCCACAGTGCGGCTGGCCACCA GGGACGATGTGCCAAGAGCTGTGCGGACACTGGCCGCTGCCTTCG CCGATTACCCTGCCACAAGACACACCGTGGACCCCGACCGGCACAT CGAGAGAGTGACCGAGCTGCAGGAACTGTTTCTGACCAGAGTGGG CCTGGACATCGGCAAAGTGTGGGTGGCCGATGATGGCGCCGCTGT GGCTGTGTGGACAACCCCTGAGTCTGTGGAAGCCGGCGCTGTGTT CGCCGAGATCGGACCTAGAATGGCCGAGCTGAGCGGCTCTAGACT GGCTGCCCAGCAGCAGATGGAAGGCCTGCTGGCCCCCCACAGACC AAAAGAGCCTGCCTGGTTTCTGGCCACCGTGGGCGTGTCACCTGAC CACCAGGGCAAGGGACTGGGATCTGCTGTGGTGCTGCCTGGGGTG GAAGCTGCTGAAAGGGCTGGCGTGCCCGCCTTCCTGGAAACAAGC GCCCCCAGAAACCTGCCCTTCTACGAGAGACTGGGCTTCACCGTGA CCGCCGACGTGGAAGTGCCTGAGGGCCCTAGAACCTGGTGCATGA CCAGAAAGCCTGGCGCCTGAATAACTTCGTATAATGTATGCTATAC GAAGTTATGGCGCGCCAAATGATTGCAGATCCACTAGTTCTAGAGC TCGCTGATCAGCCTCGACTGTGCCTTCTAGTTGCCAGCCATCTGTTG TTTGCCCCTCCCCCGTGCCTTCCTTGACCCTGGAAGGTGCCACTCCC ACTGTCCTTTCCTAATAAAATGAGGAAATTGCATCGCATTGTCTGAG TAGGTGTCATTCTATTCTGGGGGGTGGGGTGGGGCAGGACAGCAA GGGGGAGGATTGGGAAGACAATAGCAGGCATGCTGGGGATGCGG TGGGCTCTATGGCTTCTGAGGCGGAAAGAACCAGCTGGGGCTCGA GATCCACTAGTTCTAGCCTCGAGGCTAGAGCGGCCGGCCGCCCAG GGCCGGTTAATGTGGCTCTGGTTCTGGGTACTTTTATCTGTCCCCTC CACCCCACAGTGGGGCCACTAGGGACAGGATTGGTGACAGAAAAG CCCCATCCTTAGGCCTCCTCCTTCCTAGTCTCCTGATATTGGGTCTAA CCCCCACCTCCTGTTAGGCAGATTCCTTATCTGGTGACACACCCCCA TTTCCTGGAGCCATCTCTCTCCTTGCCAGAACCTCTAAGGTTTGCTT ACGATGGAGCCAGAGAGGATCCTGGGAGGGAGAGCTTGGCAGGG GGTGGGAGGGAAGGGGGGGATGCGTGACCTGCCCGGTTCTCAGT GGCCACCCTGCGCTACCCTCTCCCAGAACCTGAGCTGCTCTGACGC GGCCGTCTGGTGCGTTTCACTGATCCTGGTGCTGCAGCTTCCTTACA CTTCCCAAGAGGAGAAGCAGTTTGGAAAAACAAAATCAGAATAAG TTGGTCCTGAGTTCTAACTTTGGCTCTTCACCTTTCTAGTCCCCAATT TATATTGTTCCTCCGTGCGTCAGTTTTACCTGTGAGATAAGGCCAGT AGCCAGCCCCGTCCTGGCAGGGCTGTGGTGAGGAGGGGGGTGTC CGTGTGGAAAACTCCCTTTGTGAGAATGGTGCGTCCTAGGTGTTCA CCAGGTCGTGGCCGCCTCTACTCCCTTTCTCTTTCTCCATCCTTCTTT CCTTAAAGAGTCCCCAGTGCTATCTGGGACATATTCCTCCGCCCAGA

		GCAGGGTCCCGCTTCCCTAAGGCCCTGCTCTGGGCTTCTGGGTTTGAGTCCTTGGC

References

1 Schwinn, M. K. *et al.* CRISPR-Mediated Tagging of Endogenous Proteins with a Luminescent Peptide. *ACS Chem Biol* **13**, 467-474, doi:10.1021/acschembio.7b00549 (2018).

2 Plaper, T. *et al.* Coiled-coil heterodimers with increased stability for cellular regulation and sensing SARS-CoV-2 spike protein-mediated cell fusion. *Sci Rep* **11**, 9136, doi:10.1038/s41598-021-88315-3 (2021).

3 Carvajal-Vallejos, P., Pallisse, R., Mootz, H. D. & Schmidt, S. R. Unprecedented rates and efficiencies revealed for new natural split inteins from metagenomic sources. *J Biol Chem* **287**, 28686-28696, doi:10.1074/jbc.M112.372680 (2012).