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Consensus	MP IRSFKLKLVT HNGDSTYMDKLRRGLWKTHVI INRG IAYYMNTLALMRQEPYGSKSREE	60
B-Gen.1	MTIRSMKLKLKIYSSRSA--PQLRQGLWRLHRLLEGTAYYMDWLVMRQEALPGKSKEE	58
B-Gen1.2	MP IRSFKLKLVT HNGDSTYMDKLRRGLWKTHVI INRG IAYYMNTLALMRQEPYGSKSREE	60
B-Gen.2	MP IRSFKLKLVT HNGDSTYMDKLRRGLWKTHVI INRG IAYYMNTLALMRQEPYGSKSREE	60
Consensus	VRDLLSTLREQRRNNWSEQTGTDELLSLSRRVYELLVPSAIGEKGAQMLSRKFLSP	120
B-Gen.1	IRAELEERRVRQQQEKNGVQNDQVPMDEVLSALRQLYELLVPSAVNNSGDAQTL SRKFLSP	118
B-Gen1.2	VRDLLSTLREQRRNNWSEQTGTDELLSLSRRVYELLVPSAIGEKGAQMLSRKFLSP	120
B-Gen.2	VRDLLSTLREQRRNNWSEQTGTDELLSLSRRVYELLVPSAIGEKGAQMLSRKFLSP	120
Consensus	LVDPNSEGGRGTA SGRKPRWKKMMEEGHPDWEKEKEKDAAKKAEDPTASILADLEAVGL	180
B-Gen.1	LVDPNSEGGKGT SNAGAKPGWRKKQEAQDP SWEKDYERWLKRKQADPTAEILGKLETAGL	178
B-Gen1.2	LVDPNSEGGRGTA SGRKPRWKKMMEEGHPDWEKEKEKDAAKKAEDPTASILADLEAVGL	180
B-Gen.2	LVDPNSEGGRGTA SGRKPRWKKMMEEGHPDWEKEKEKDAAKKAEDPTASILADLEAVGL	180
Consensus	LPLFPLFSDEQKEIRWLPKKKRQFVRTWDRDMFQQALERMLSWE SWNRRVAEEYXKLQAAQ	240
B-Gen.1	KPLFPLYTNEVKDIRWMPLTSKQYVRNWD RDMFQQAIEHL LSWETWNRKVN EERAKLKET	238
B-Gen1.2	LPLFPLFSDEQKEIRWLPKKKRQFVRTWDRDMFQQALERMLSWE SWNRRVAEEYQKLQAAQ	240
B-Gen.2	LPLFPLFSDEQKEIRWLPKKKRQFVRTWDRDMFQQALERMLSWE SWNRRVAEEYLKLQAAQ	240
Consensus	RDEVYAKYLEDAGSWLNDLQTFEKQREEELAEVSFEPNSEYLITRRQIRGWKEVYEKWSK	300
B-Gen.1	VRRFEEQH LANGKDWLSP LQAYE ANREQALRDMAISPSDRFRITRRQIKWSEL YERWVK	298
B-Gen1.2	RDEVYAKYLEDAGSWLNDLQTFEKQREEELAEVSFEPNSEYLITRRQIRGWKEVYEKWSK	300
B-Gen.2	RDEVYAKYLEDAGSWLNDLQTFEKQREEELAEVSFEPNSEYLITRRQIRGWKEVYEKWSK	300
Consensus	TSENASQEQLWRMVADVQTAMAGAFGDPKVYQFLSQPKHHHIWREHPNRLFYYSKYNEVR	360
B-Gen.1	LAPTASVEAYMQEVRHVQKKLGGTFGDADLYRFLAKPENVHIWRD HQRLLHYAAYNDLH	358
B-Gen1.2	TSENASQEQLWRMVADVQTAMAGAFGDPKVYQFLSQPKHHHIWREHPNRLFYYSKYNEVR	360
B-Gen.2	TSENASQEQLWRMVADVQTAMAGAFGDPKVYQFLSQPKHHHIWREHPNRLFYYSKYNEVR	360
Consensus	EKLNRAKKQAAF TLPDPVEHPLWTRFDARGGNIHDYE----ISKVGKQYHVTFSSLILPE	416
B-Gen.1	KRLMSAKEQAAF TLPDPVAHPLWTRFDARDGNLFTYILQADSSKQSRRYVNF SRFLWPV	418
B-Gen1.2	EKLNRAKKQAAF TLPDPVEHPLWTRFDARGGNIHDYE----ISKVGKQYHVTFSSLILPE	416
B-Gen.2	EKLNRAKKQAAF TLPDPVEHPLWTRFDARGGNIHDYE----ISKVGKQYHVTFSSLILPE	416
Consensus	AQSW-VEIENVTVGIGNSLQLKRQIRLDGYADKKQKVKYDYSSRFELTGVLGGAQIQFD	475
B-Gen.1	EDGYFEETENVKVELALSKQFYRQVI VHDNPTGKQKITFDYSSKEILECHLGGAQLQLD	478
B-Gen1.2	AQSW-VEIENVTVGIGNSLQLKRQIRLDGYADKKQKVKYDYSSRFELTGVLGGAQIQFD	475
B-Gen.2	AQSW-VEIENVTVGIGNSLQLKRQIRLDGYADKKQKVKYDYSSRFELTGVLGGAQIQFD	475
Consensus	RKHLKKAHRLAEGETGPIFLNVVVDVEPFLEVKNRGLRTPLGQVLQVNTR--DWPKVVD	533
B-Gen.1	RNFIRKSGRDFETGDFGPAFLNVVLDLKPQEVKNRGLQSPLGQALLVKS RPN DIPKVG	538
B-Gen1.2	RKHLKKAHRLAEGETGPIFLNVVVDVEPFLEVKNRGLRTPLGQVLQVNTR--DWPKVVD	533
B-Gen.2	RKHLKKAHRLAEGETGPIFLNVVVDVEPFLEVKNRGLRTPLGQVLQVNTR--DWPKVVD	533
Consensus	YKAKELSVLMENTQIGNENG VSTIEAGMRIMSIDLGQRTAAAVSIFEVISKKPDEKETKL	593
B-Gen.1	YKPDALAAWLEQASGEESLGSESLRQGRVMSIDLGVSAAAISVFSVKGEKTREGD-KV	597
B-Gen1.2	YKAKELSVLMENTQIGNENG VSTIEAGMRIMSIDLGQRTAAAVSIFEVISKKPDEKETKL	593
B-Gen.2	YKAKELSVLMENTQIGNENG VSTIEAGMRIMSIDLGQRTAAAVSIFEVISKKPDEKETKL	593

FIG. 1

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Consensus	FYP IADTDLYAVHRRSLLLRLPGEEISSKKMIEKRKERARIRSLVRYQIRLLSEVLRRLHT	653
B-Gen.1	CYPVGETGLFAVHDSFLLRLPGES-SEKRVNVERDKRKTERMQIRYHIRTLLARVLRRLAN	656
B-Gen1.2	FYP IADTDLYAVHRRSLLLRLPGEEISSKKMIEKRKERARIRSLVRYQIRLLSEVLRRLHT	653
B-Gen.2	FYP IADTDLYAVHRRSLLLRLPGEEISSKKMIEKRKERARIRSLVRYQIRLLSEVLRRLHT	653
Consensus	QGTAEQRRFKLDELLVSIQXKL---ELDQSEWISELEKLFIDYIDESAEKWKEALVVAHRT	710
B-Gen.1	KATPMDRIKAVQDVINDIESTRFMNDHDDHVYNHALETLLRTYAPDHQGIWEEQVIAAHRQ	716
B-Gen1.2	QGTAEQRRFKLDELLVSIQXKL---ELDQSEWISELEKLFIDYIDESAEKWKEALVVAHRT	710
B-Gen.2	QGTAEQRRFKLDELLVSIQXKL---ELDQSEWISELEKLFIDYIDESAEKWKEALVVAHRT	710
Consensus	LEPIVVEAVRNWKKSLSKENKDRRRIAGISISWIEELEEETRKLLIAWSKHSREPGIPKRL	770
B-Gen.1	LEHHVGVIVGEWRKNWG---KDRRGTVGLSMDNIEELDEMRLLISWSRRARYPREAKPF	773
B-Gen1.2	LEPIVVEAVRNWKKSLSKENKDRRRIAGISISWIEELEEETRKLLIAWSKHSREPGIPKRL	770
B-Gen.2	LEPIVVEAVRNWKKSLSKENKDRRRIAGISISWIEELEEETRKLLIAWSKHSREPGIPKRL	770
Consensus	EKEETFAPHLQHIQNVKDDRLKQMANLFVMTALGYKYDEGNKRWVEAYPACQVILFEDL	830
B-Gen.1	QVNEENPVHLRLHQLKEDRLKQLANLIVMTALGYVYDSKEKKWKAAYPACQLILFEDL	833
B-Gen1.2	EKEETFAPHLQHIQNVKDDRLKQMANLFVMTALGYKYDEGNKRWVEAYPACQVILFEDL	830
B-Gen.2	EKEETFAPHLQHIQNVKDDRLKQMANLFVMTALGYKYDEGNKRWVEAYPACQVILFEDL	830
Consensus	SRYRFALDRPRENNRLMKWAHRSIPRLTYMQAELFGIQVGDVYSAYTSRFHAKTGAPGI	890
B-Gen.1	QRYRFHLDRSARENSQLMKWAHRSIPKYVWMQGEPLYGLQIGDVWAGFTSRYHAKTGAPGI	893
B-Gen1.2	SRYRFALDRPRENNRLMKWAHRSIPRLTYMQAELFGIQVGDVYSAYTSRFHAKTGAPGI	890
B-Gen.2	SRYRFALDRPRENNRLMKWAHRSIPRLTYMQAELFGIQVGDVYSAYTSRFHAKTGAPGI	890
Consensus	RCHALTEADLQSNYSYVYNQLIKDKFIQDNQTEILKAGQIVPWQGGELFVTFADRSGASLA	950
B-Gen.1	RCKALTEKDFQQGR-LLESIVAEGMFTLQEVGTLKPGDIPVAEGGELFVTLADDSGDRIV	952
B-Gen1.2	RCHALTEADLQSNYSYVYNQLIKDKFIQDNQTEILKAGQIVPWQGGELFVTFADRSGASLA	950
B-Gen.2	RCHALTEADLQSNYSYVYNQLIKDKFIQDNQTEILKAGQIVPWQGGELFVTFADRSGASLA	950
Consensus	VIHADINAAQNLQKRFWQHNSEVFRVPCKVVKG----GLVPVYEKMRKLF GKGLFVN-ID	1005
B-Gen.1	ITHADINAAQNLQKRFWLANSEFRVACRSVQIASQECFIPSSSVAKMKMGKGVFRDFS	1012
B-Gen1.2	VIHADINAAQNLQKRFWQHNSEVFRVPCKVVKG----GLVPVYEKMRKLF GKGLFVN-ID	1005
B-Gen.2	VIHADINAAQNLQKRFWQHNSEVFRVPCKVVKG----GLVPVYEKMRKLF GKGLFVN-ID	1005
Consensus	DPESKEVYRWEHSTKMKSKTTPVDLESE--DI-DHEELSDEWEDMQEGYKTLLRDPSGFF	1062
B-Gen.1	FHKDMFVYHWNQVLTAKNVPTDHSDDLQDLQDYQAILEEARESSSYKTLFRDPSGFF	1072
B-Gen1.2	DPESKEVYRWEHSTKMKSKTTPVDLESE--DI-DHEELSDEWEDMQEGYKTLLRDPSGFF	1062
B-Gen.2	DPESKEVYRWEHSTKMKSKTTPVDLESE--DI-DHEELSDEWEDMQEGYKTLLRDPSGFF	1062
Consensus	WSSDSWIPQKDFWIRVKSRIKSLREQI--R	1091
B-Gen.1	FPDDVWVPQNIYWEVKKTTITALLRKRIMST	1103
B-Gen1.2	WSSDSWIPQKDFWIRVKSRIKSLREQI--R	1091
B-Gen.2	WSSDSWIPQKDFWIRVKSRIKSLREQI--R	1091

FIG. 1
Continued

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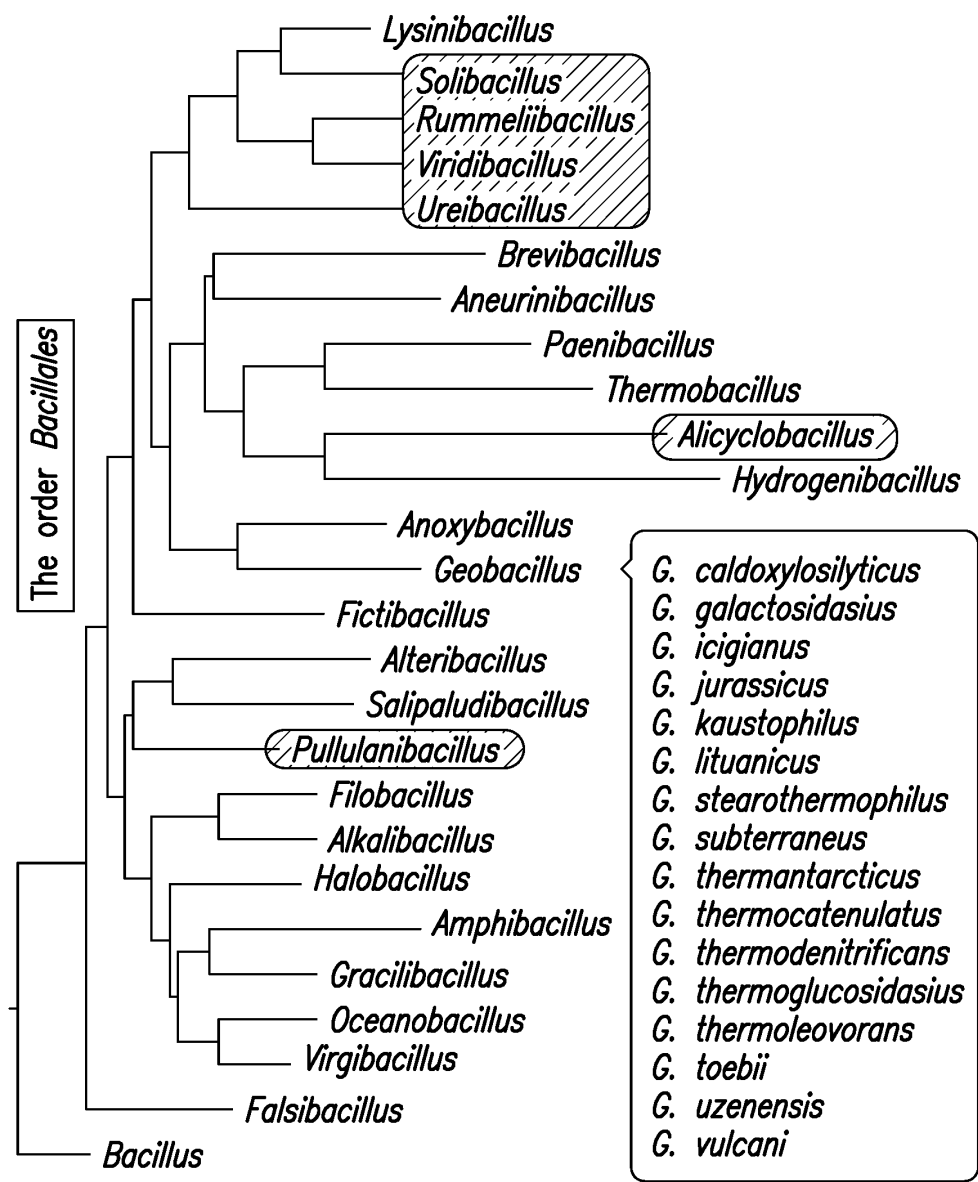


FIG.2A

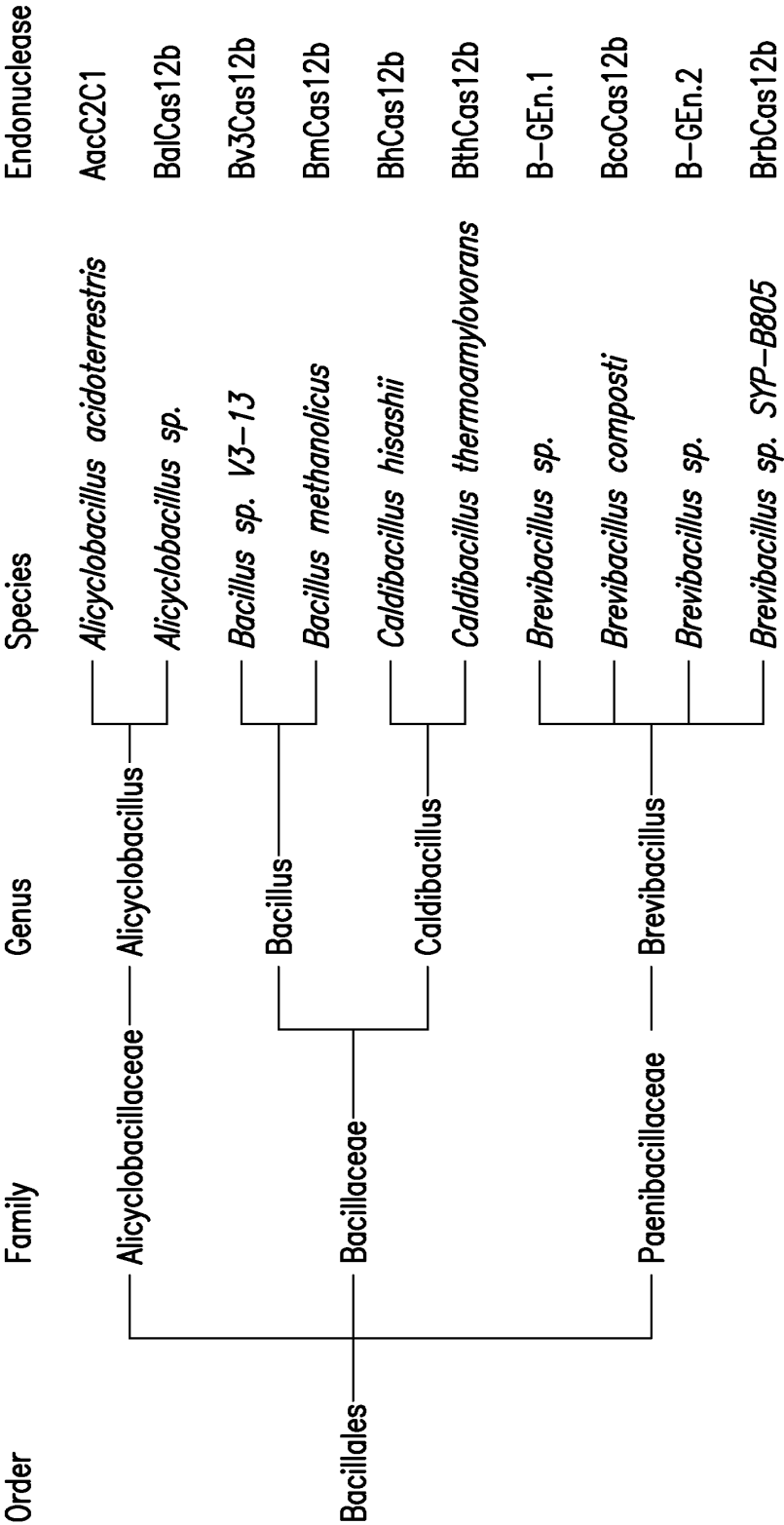


FIG.2B

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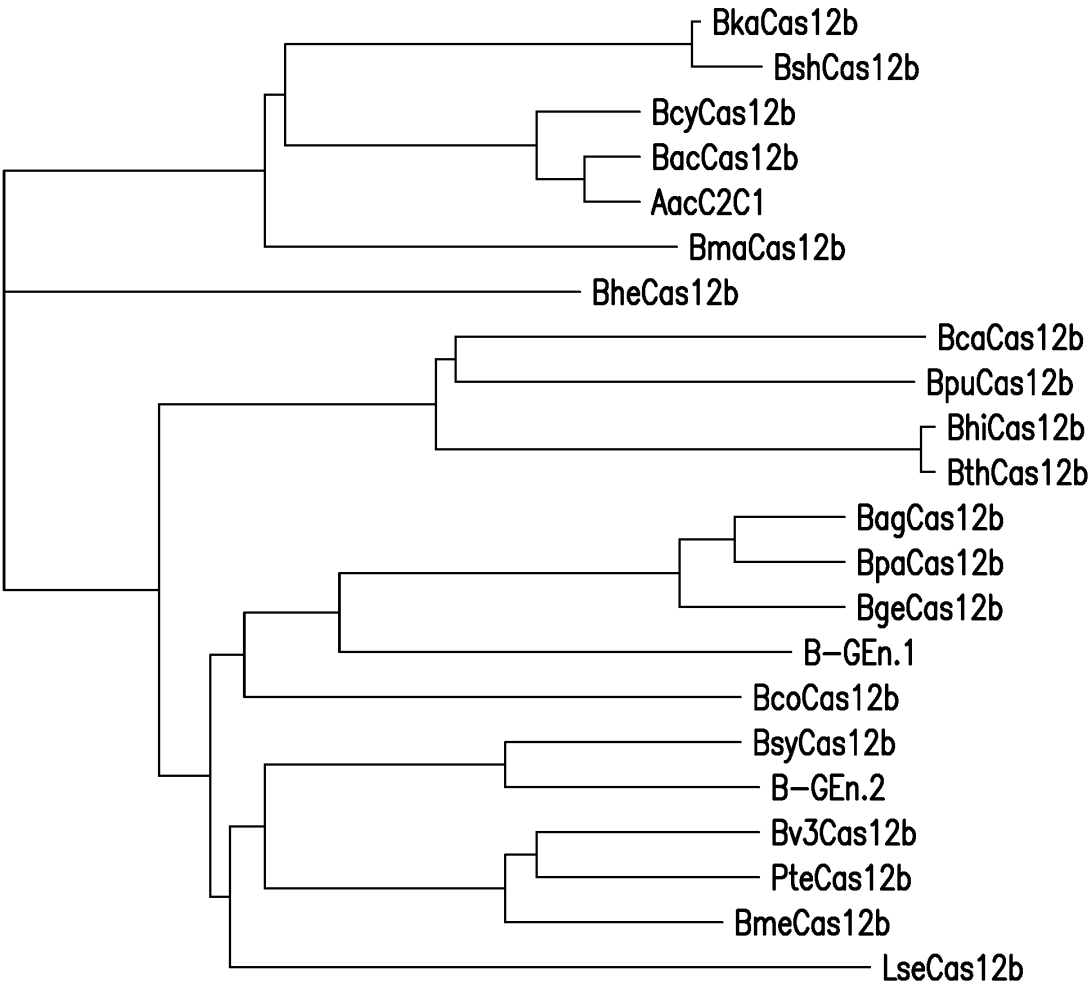


FIG.2C

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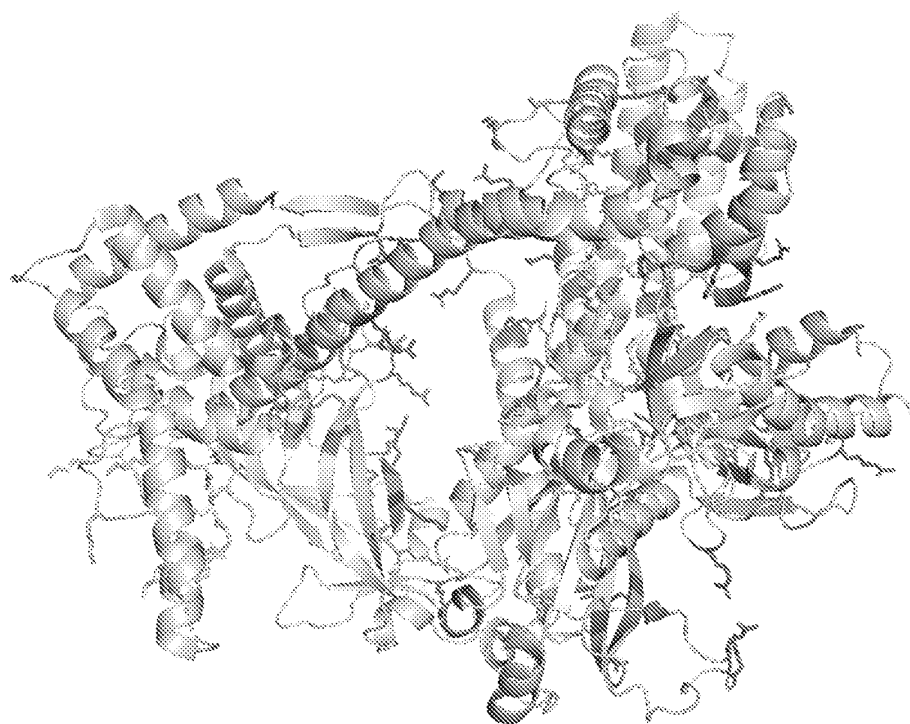


FIG.3A

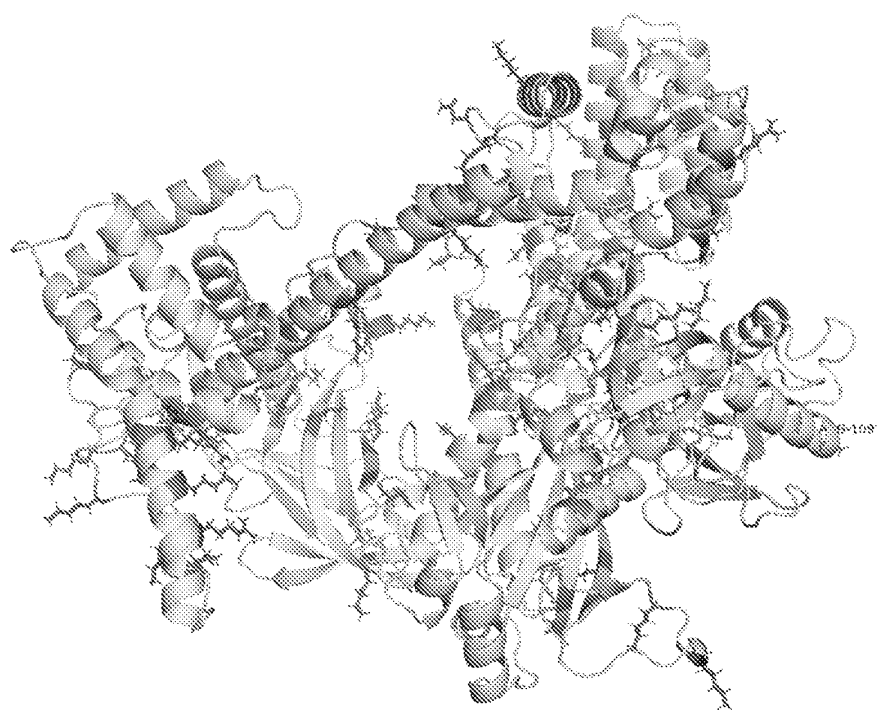


FIG.3B

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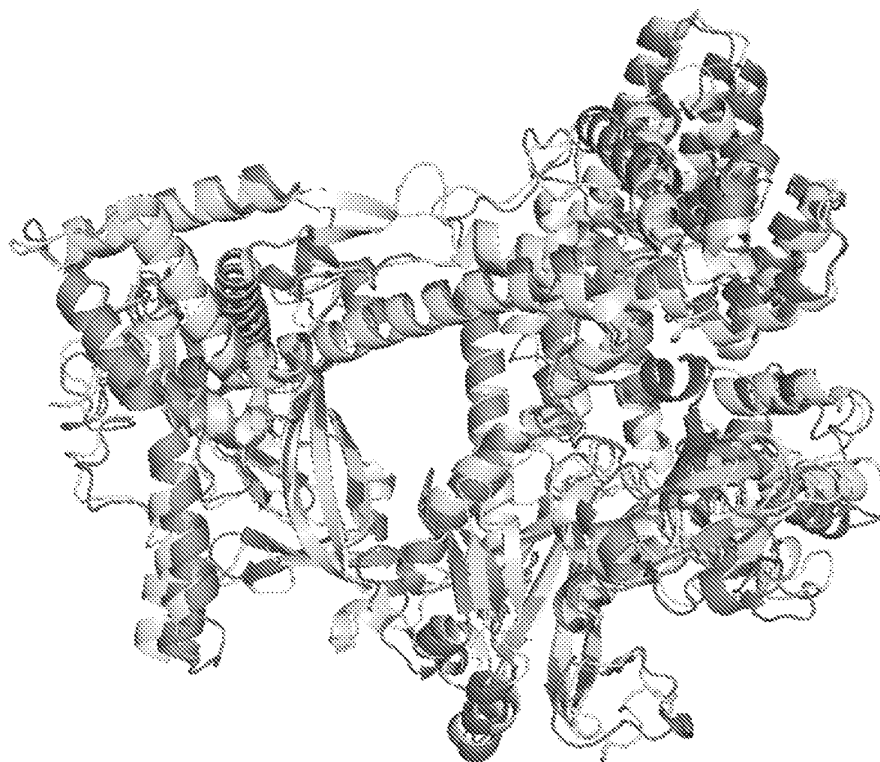


FIG.3C

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	1	10	20	30	40	50	60										
Consensus	MA	RS	KL	KL	XXXXXX	--	XXXLR	GLW	TH	XXXN	XG	AYYM	XX	XL	XRQE	XXXXXX	--
BkaCas12b	MAVKS	IKVK	LRL	SE	----	CPD	ILAG	MWQL	HRAT	NAGV	RYTE	WVSL	MRQE	IL	YSRG	P--	
BcyCas12b	MAVKS	IKVK	LRL	ND	----	MPE	IQAG	LWKL	HTEV	NAGV	RYTE	WLSL	LQEN	LY	RRSP	SG	
BacCas12b	MAVKS	IKVK	LRL	DN	----	MPE	IRAG	LWKL	HTEV	NAGV	RYTE	WLSL	LQEN	LY	RRSP	NG	
BmaCas12b	M--	KSIK	VKL	ML	GH	----	LPE	I	REGL	WHL	HEAV	NLGV	RYTE	WL	ALL	RQGN	LY
BshCas12b	-----																
BagCas12b	MAIRS	IKL	KL	KT	HT	GPE	--	AQN	LR	KG	I	WR	TH	RL	NE	GV	AYYM
AacC2C1	MAVKS	IKVK	LRL	DD	----	MPE	IRAG	LWKL	HKEV	NAGV	RYTE	WLSL	LQEN	LY	RRSP	NG	
BsyCas12b	MPVRS	FKV	KL	V	TR	SGDA	EH	ML	QL	RR	GL	WK	THE	I	V	NQ	GI
Bv3Cas12b	MAIRS	IKL	K	M	K	T	NS	G	T	--	SIY	L	R	K	A	L	W
PteCas12b	MVRS	IKL	K	M	K	T	NS	G	T	--	SIY	L	R	K	A	L	W
BcoCas12b	MAIKS	MKL	KL	K	T	K	S	G	SN	--	ALS	I	R	K	L	W	K
LseCas12b	MSIRS	FKL	K	I	K	T	K	S	GVN	--	AEEL	R	R	G	L	W	R
BheCas12b	MTVRS	IRV	K	L	A	V	G	S	P	-Q	--	YRD	V	R	R	G	L
BmeCas12b	MAVRS	MKL	K	M	K	T	N	T	G	QD	--	SIH	L	R	K	A	L
BcaCas12b	MATKS	F	I	L	K	M	K	T	K	N	----	NPQ	L	R	L	S	L
BpaCas12b	MAIRS	IKL	KL	K	T	R	T	G	P	E	--	AQN	LR	KG	I	WR	TH
BpuCas12b	MAVRS	FKL	K	I	M	A	G	Q	----	NEK	L	R	K	A	L	W	K
BhiCas12b	MATRS	F	I	L	K	I	E	P	N	-----	EEV	K	G	L	W	K	T
BthCas12b	MATRSF	ILKIEPN	-----	EEV	K	G	L	W	K	T	HEV	L	N	H	G	I	A
BgeCas12b	MAIRS	IKL	KL	K	T	N	T	G	P	E	--	AQN	LR	KG	I	WR	TH
B-Gen.1	MTIRS	MKL	KL	K	I	Y	S	G	R	S	--	APQ	L	R	Q	G	L
B-Gen.2	MPIRS	FKL	KL	V	T	H	N	G	D	S	T	Y	M	D	K	L	R

FIG.4

	1	10	20	30	40	50	60
Consensus	X-XXXXXXTKEEXQXELXXXXRXXQXXNXXXXX--X-XXDXEXLXXLRXLYELLVPSXXG						
BkaCas12b	DGGQQCYMTAEDCQRELLRRLRNRLHNGRQDQ--P-GTDADLLAISRRLYEILVLQSIG						
BcyCas12b	DGAQECDKTAEQCKAELLERLRARQLENGHRGP--A-GSDDELLQLARQLYELLVPQARG						
BacCas12b	DGEQECYKTAECKAELLERLRARQVENGHCGP--A-GSDDELLQLARQLYELLVPQAIG						
BmaCas12b	DGAQECYMTAEQCRQELLVRLRDRQKRNGHTGD--P-GTDEELLGVARRLYELLVPQSVG						
BshCas12b	-----						
BagCas12b	-----ERPQELQEELICHIREQQQRNQADKNTQA-LPLDKALEALRQLYELLVPSSVG						
AacC2C1	DGEQECDKTAECKAELLERLRARQVENGHHRGP--A-GSDDELLQLARQLYELLVPQAIG						
BsyCas12b	-----GKSREVVRLLELLHSLRAQQKRNNWTGD--A-GTDDEILNLSRRLYELLVPSAIG						
Bv3Cas12b	-----DKTKEAYQAELEINIIRNQQRNNGSSEE--H-GSDQEILALLRQLYELIIPSSIG						
PteCas12b	-----DRTKEEIQSELEIKKIREQQQRNGLSEE--L-GSDQEILSLLRHLIELIIPSSING						
BcoCas12b	-----LRSKEELRLELILRLKROQQQNGYVGD--SSNIPEEVFTVLRELYECIVPSSVR						
LseCas12b	T-NEIEKRSKEEIQGELLERVHKQQQRNQWSGE--V--DDQTLLQTLRHLIEEIVPSVIG						
BheCas12b	HGLTVVQRTREDIQAEILLSRLRTLQSAHQHSGD--M-GTDEELLSLMRQLYEQLVPSSVD						
BmeCas12b	-----DKTKEEIQSELELQKIREQQQRNNGSLKE--I-GSDQEILTLLRQLYELIIPSAIG						
BcaCas12b	DPDHPVVLKKEEIQERLWMKVRETQQKNGFHGE--V--SKDEVLETLRALYEELVPSAVG						
BpaCas12b	-----GQTKKELQEELVRHIREQQQKNRADKNTQA-LPLDKALEALRQLYELLVPSSIG						
BpuCas12b	TTQDTPSRTKERLQEELWTRVREAQHRNEFTSV--V--NKQEVLETLRLLYEQLVPSAAG						
BhiCas12b	DPKNPKKVSKEIQAELEWDFVLKMQKCNSF THE--V--DKDEVFNILRELYEELVPSSVE						
BthCas12b	DPKNPKKVSKEIQAELEWDFVLKMQKCNSF THE--V--DKDEVFNILRELYEELVPSSVE						
BgeCas12b	-----KKTKEEIQEELIRHIRAQQQRNHADEKTQA-LPLEKALEALRKLIELLYELLVPSSVG						
B-GE _n .1	-----GKSKEEIRAELERRVRQQQEKNGVQND--Q-VPMDEVLSALRQLYELLVPSAVN						
B-GE _n .2	-----SKSREEVRLDLLSTLREQQRNWNSEQ--T-GTDEELLSLRRVYELLVPSAIG						

FIG.4
Continued

Consensus	---XSGDAQXXXRKFLSPLVDPNSXGGKGTSAKGRKPXWXXXKEAGDPXWEVEXXXXXXRXKXXDPTAXLXGLXXGLXPLFXXTX-----X-XIXWVPLXKXQXVRTWDRDMFQQAIE
BkaCas12b	---KRGDAQIASSFLSPLVDPNSKGGRCFAKSGRKPQWQKMRDQGPRAWAAREKEYEQRAVDPSKEILNSDALGLRPLFAVFTET-----YRSGVDWKPGLKSGQSVRTWDRDMFQQAIE
BeyCas12b	---AKGDAQISRKFLSPLTRDAVGGCLGTSKAGNKPWWRMRDAGEPGWEEKAKAEARKSADVTADVLHALADFGCLKPLMRVYTES-----EMSSVQWKPRLQCGQAVRTWDRDMFQQAIE
BacCas12b	---AKGDAQIARKFLSPLADKDAVGGCLGTAAGNKPWWRMREAGEPGWEEKAKAEARKSTDRTADVLRALADFGCLKPLMRVYTDSD-----DMSSVQWKPRLKCGQAVRTWDRDMFQQAIE
BmaCas12b	---KKGQAQMLASGFLSPLADPKSEGGKGTSGSKRKPANWGMKEAGDSRWWEAKARYEANKADPTKQVITASLEMYGLRPLFDVFTET-----Y-KTIRMMPLGKHQGVRAWDRDMFQQSLE
BshCas12b	-----MDALGLRPLFVFTET-----YKSGVDWKPGLKSGQSVRTWDRDMFQQAIE
BaqCas12b	---QSGDAQIISRKFLSPLVDPNSEGGKGTSAKAGKPTWQKKKEANDPTWEQDYEKWKRRREEDPTASVITILEEYGI RPLFYTN-----V-TDIAWLPQSNQFVRTWDRDMLQQAIE
AacC2c1	---AKGDAQIARKFLSPLADKDAVGGCLGTAAGNKPWWRMREAGEPGWEEKAKAEARKSADRTADVLRALADFGCLKPLMRVYTDSD-----EMSSVWKPRLKCGQAVRTWDRDMFQQAIE
BsyCas12b	---EKGDAQMLSRKFLSPLVDPNSEGGKGTSAKSGRKPWWKMRREEGHPDWEAEREKDRAKKAADPTASILNDLEAFGLRPLFLFTDE-----Q-KGIQWLPKQKRQFVRTFDRDMFQQAIE
Bv3Cas12b	---ESGDANQLGNKFLYPLVDPNSQSGKGTSNAGRKPWWKRLKEEGNPDWELEKKDEERKADPTVKIFDNLNKYGLLPLFPLFTNI-----Q-KDIEWLPGLKQSVRKWKDKDMFIQAIE
PteCas12b	---ESGDANQLGNKFLYPLVDPNSQSGKGTSNAGRKSWKRMKEEGNPDWEVEFKDEERKANDPTIKVFDHLKKYSLPLFPLFTNN-----Q-KDIEWLPMGKQSVRKWKDKDMFIQAIE
BcoCas12b	---QSGDAQVLSRKYLSPVDPKSKGGEGESKAGRKPWWLLKQEAGDPSEWQDYEKAKRKESDPTARLMQKLREYGLKPLFPLFTNE-----Q-KEIQWLPKENQYVRTWDRDMFQQAIE
LseCas12b	---KSGNASLKARFFLGPLVDPNNKTTKDYKSGPTPKWKKMKDAGDPNWQVEYKYMNERQ-----TLVRLEEMGLPLFPMYTD-----V-GDIHWLPQASG-YTRTWDRDMFQQAIE
BheCas12b	KNKSGDARMIARNFNPLTNPSQSGCLGTSNAGRKPWWLLKLSGPTWEEDYKAMEQKQESSVSFLLLELRFGHPHIFPYTDT-----V-LEVSWAPKKARQWVRKWDYDLFQQSIE
BmeCas12b	---ESGDANQLGNKFLYPLVDPNSQAGKGTSAKGRKPWWKRMQEEGDPNWEIEKQKDDERKADRTVKILNNLNLGLPLFTLFTSK-----Q-KDIEWLPMGKQSVRKWKDKDMFIQAIE
BcaCas12b	---KSGEANQISNKYL YPLTDPASQSGKGTANSGRKPWWKLLKEAGDPXWQDAYEKWEKERQEDPKLILAAQSFGLPLFRPFTENDHKAV- ISVWMPKSKNQSVRKFDKDMFNQAIIE
BpaCas12b	---QSGDAQIISRKFLSPLVDPNSEGGKGTSAKAGKPTWQKKKEANDPTWEQDYEKWKRRREEDPTASVITILEEYGI RPLFYTN-----V-ADIAWLPQSNQFVRTWDRDMLQQAIE
BpuCas12b	---ESGEANQICNKYL YPLTDANSQSGKGTASSGRKPWWKLLKGAGDPSEWEEKKWAEQRQKDPKLQIMNRLDYGLLPLFPLFTDSEDPFV-RDI TWLPKSKKQSVRKWKDKDMFNQAIIE
BhiCas12b	---KKGAEANQLSNKFLYPLVDPNSQSGKGTASSGRKPWWYNLKIAGDPSEWEEKKWEEKKDPKLAKITLGLKAEYGLIPLFIPYTDSEPIV-KEIKWMEKSRNQSVRRLDKDMFIQALE
BthCas12b	---KKGAEANQLSNKFLYPLVDPNSQSGKGTASSGRKPWWYNLKIAGDPSEWEEKKWEEKKDPKLAKITLGLKAEYGLIPLFIPYTDSEPIV-KEIKWMEKSRNQSVRRLDKDMFIQALE
BgeCas12b	---QSGDSQIISRKFLSPLVDPNSEGGKGTSAKAGKPAWQKKKEANDPTWQDYEKWKRRREEDPTASVITILEEYGI RPLFYTN-----V-AEIAWLPKSGQFVRTWDRDMFQQAIE
B-GE n. 1	---NSGDAQTLISRKFLSPLVDPNSEGGKGTSNAGKPGWRKKQEAGDPSEWQDYERWILKRQKADPTAETILGKLETAGLKPLFPLFTNE-----V-KDIRMMPLTSKQYVRWDRDMFQQAIE
B-GE n. 2	---EKGDAQMLSRKFLSPLVDPNSEGGRGTA KSGRKPWWKMMEEGHPDWEKEKEKDAAKKAEDPTASILADLEAVGLLPLFPLFTSDE-----Q-KEIRWLPKKKRQFVRTWDRDMFQQAIE

FIG.4
Continued

Consensus	NXXIWRXXPPXXXXXXAYXNXXXXKLXXAKXXATFTLPDXXXXHPLWRFXXXGG-NLXXYYXXXXXX-----XXRXVXFXXLXPX-XX-G-WEXXXXXVVLAXSQFXXQXXXX
BkaCas12b	YQPLWRADEFTLTRYALYNGVLRDLEKARQFATFTLPDCAVNP IWRFESSQGS-NLHKYEF LFDH-----LGPGRHVRQRL LWE-SE-G-AKERDSWVPVAPSGQLDKLVR-E
BcyCas12b	YQALWREDAFSLTRYAAYNGILRKLNHAKMFATFTLPDPTVHP IWARFDKL-GG-NLHQYTF LFN-----FGEGRHAI RFQKLKVE-NG-V-AKEVDDVTVP I SRSTQLDNLLPR--
BacCas12b	YQALWREDAFSLTRYAVVNSIVRKLNHAKMFATFTLPDATAHP IWRFDKL-GG-NLHQYTF LFN-----FGEGRHAI RFQKL TVE-DG-V-AKEVDDVTVP I SMSAQLDLLPR--
BmaCas12b	FQPLWREDPSFLSRWASYNELNKLEDAKQFATFTLPSPCSNPVWARFENAEGT-NIFKYDF LFDH-----FGKGRHGVRFQRM IVMR-DG-V-PTEVEGI VPIAPSRQLDALAPN--
BshCas12b	YQPLWRADEFTLTRYALYNGVLRDLEEAQFATFTLPDCAVNP IWRFESSQGS-NLHKYEF LFDH-----LGPGRHVRQRL LWE-SE-G-AKEKDSWVPVAPSGQLDKL VPR-E
BagCas12b	NRL IWKGNPQR IHYFVARNELTKRLEEAQSA TMTLPNARKHPLWRFDAR-GG-NLQDY YL TAEA-----DKPRSRRFVTSQ I WPS-ES-G-WMEKKDVEVELALSRQFYQKVLLK
AacC2c1	YQALWREDAFSLTRYAVVNSILRKLNHAKMFATFTLPDATAHP IWRFDKL-GG-NLHQYTF LFN-----FGERRHAIRFHKLKVE-NG-V-AREVDDVTVP I SMSEQLDNLLPR--
BsyCas12b	HHHIWRGYPNRLFHYSDYNGVRKKLQRARHDAFTLPDPVEHPLWTRFDAR-GG-NIHDYE I SQ-----NG-KQYQVTF SRLLWPE-NE-T-WWERENVTVAIGASQQLKRQIRLDG
Bv3Cas12b	NRD IWRGHSERIYHIAAYNGLQKKLSRTKEQATFTLPDAIEHPLWIRYESP-GGTNLNLFKLEE-----KQKNYVYVTL SKI I WPS-EE-K-WIEKENIEIPLAPS I QFNRIKLKQ
PteCas12b	NMD IWRKHPERIYHIA TYNGLLKKLSHTKAQATFTLPDAVKHPLWIRYEAQ-CGTNLNLFKLEE-----TTKNCKVIL SKI I WPTI-ED-G-WFEKENVEVDLAPSQFYRQIKLQD
BcoCas12b	NH IWRDHQDRFLGQTYNELKRRLAQVKEQATFTLPDPVNHPLWTRFDAR-GG-NLHDYDLWQES-----RKSRSRQTVTSS I WPS-DQ-G-WEEQADVEVELALSQFYRQVRIQD
LseCas12b	NHDIWRGYPERV I DFAELNHLQRELRRAKEDATFTLPDSVDHPLWRYEAP-GGTNIHDYDLVQ-----DTKRNL TLILDKF ILDPD-EN-GSWHEVKVPFSLAKSKQFHRQVWLQE
BheCas12b	YWSLWRS DPTKILRFARLALQRAVARAKRHARLTLPDAIHP IWRIDYAK-GK-NIYSYRLL I PE-----KRSKRYVVEFSS I IMPDGEN-R-WAEHRNIRVPLAFSRQWERLHFS-I
BmeCas12b	NRD IWRGHPERIYRIAVYNGLLKRLSQTREQATFTLPDAIEHPLWIRYEAQ-CGTNLNLFKLEQ-----NSKKEIKVIL SKMIWPK-EE-G-WFEKEKVEITLAPSQKSI RQ I ILEE
BcaCas12b	NQAAWREYPEFLPYKYRHAEQRMKTAKKQATFTLCDPIRHPLWIRYEEER-SGTNLNKYRILIMN-----EKEKVQFDRL ICLN-ADGH-YEEQEDVTVP LAPSQQFDDQIKFSS
BpaCas12b	HHLIWKGNPQR IHYFVARNELKKRLEEAQNA TMTLPDARKHPLWRFDAR-GG-NLQDY YL TAEA-----DNPRSRRFVTSQ I WPN-ES-G-WMEKQDVEVELALSRQFYQVVTLQK
BpuCas12b	NHF IWRNNKEFPFLYAKYSETKLIMNAKKQATFTLSDPIEHPLWIRFEER-SGTNLNKYKMITSDQKSEKRVPLTVEVDRF IVPN-GEDG-YLEEAKYKQLAPSROFYNQVLF SK
BhiCas12b	NHF IWRNHPEYPYL YATFCEIDKKKKDAKQATFTLADPINHPLWIRFEER-SGSNLNKYRILTEQL--HTEKLKKLTVQLDRLIYPTI-ESGG-WEEKGKV D I VLLPSROFYNQIFLDI
BthCas12b	NHF IWRNHPEYPYL YATFCEIDKKKKDAKQATFTLADPINHPLWIRFEER-SCSNLNKYRILTEQL--HTEKLKKLTVQLDRLIYPTI-ESGG-WEEKGKV D I VLLPSROFYNQIFLDI
BgeCas12b	NRL IWKGNPQR IHYFVARNELTKKLEKAKQSA RRTL PDANKHPLWRYDAR-GG-NLQDY YL TAE-----DKPRSRRFVTSQ I WPS-ES-G-WLEKKDVQAE LALSRQFYQVVTFLK
B-GE n. 1	NVHIWRDHQERLHYAAYNDLHKRLMSAKEQAFTLPDPVAHPLWRFDAR-DG-NLFTYTLQADS-----SKQSRRYVNF SRFLWPV-ED-GYFEEITENVKVELALSQFYRQYIVHD
B-GE n. 2	HHHIWREHPNRLFYYSKYNEVREKLNRAKKQAFTLPDPVEHPLWTRFDAR-GG-NIHDYE I SK-----VG-KQYHVTFSS I LPE-AQ-S-WWEIENVTVG I GNSLQLKRQIRLDG

FIG.4
Continued

+
XXK-GK--XXXXF/DXXX-----XXLXG/LGGAQIQ/RXLXXXXX--XX-----XGXXG/WYLNXXVDXXPXXEX--XXGRXXXPGXXLXXXX--XXX
Eek-SS--VALHLHDITAR-----PDGFMAEWAGAKLQYERSTLARKARR--DKQGMRSMRRQPSMLMSAAQMLEDAKQAGDYLNISVRKSPSEV-R-QGRRPPYAALFRIDD--KQR
BeyCas12b GST-EP--IALYFRDYGA-----EQPFGEFGGAKIQYRDDQLQLRRR--K-----GAGDYLNFSVRVQSSEA-R-GERRPPYAAVFRLIG--DNN
BacCas12b DPH-EL--VALYFQDYG-----EQLAGEFGGAKIQYRDDQLNHLHAR--R-----GARDVYLNLSVRVQSSEA-R-GERRPPYAAVFRLVG--DNN
BmaCas12b DAA-SP--IDVFVGDPA-----PGAFRGQFGGAKIQYRRSALMRKGR--EERKAYLCGFRLPSQR--RTGTPADDAGEVELNLSRVESSQEQ-A-GRRNPPYAAVFHISD--QTR
BshCas12b Eek-SS--VALHLHDITAQ-----PDGFMAEWAGAKLQYERSTLARKARR--DKQGMRLWRRQPSMLMSAVQMLEDAKQAGDYLNISVRKSPSEV-R-QGRRPPYAALFRIDD--KQR
BagCas12b NDK-GK--QKIEFKDKGS-----GSTFNGHLGGAKLQIERGDLKEEKN--FE-----DGEIGSVYLNVDIEFELQEV-KNGRVQAPYGQVLQLIRRPNEF
AacC2C1 DPN-EP--IALYFRDYGA-----EQHFTGEFGGAKIQCRRDQLAHMHR--R-----GARDVYLNLSVRVQSSEA-R-GERRPPYAAVFRLVG--DNN
BsyCas12b YAD-KK--QKVRDYDYSS-----GIELTGVLCGAKIQFDRRHILKASNR--LA-----DGETGPVYLNVDIEFELAM-RNGRLQTPIGQVLQWNT--KOW
Bv3Cas12b HVK-GK--QEISFSDYSS-----RISLDGVLGGSRIQFNRYIKNHKE--LG-----EGDIGPVFFNLVVDVAPLQET-RNGRLQSPIGKALKVIS--SDF
PteCas12b HIK-GK--QEISFSDYSS-----GISLKGVLGGSRIQFDRKYIENHQL--LP-----SGDIGPVFFNLVIDLLPIQET-RNGRLKSPIGKTLKWS--SEF
BcoCas12b HTK-GK--QEIIFYDYSVHSGKPIPLHGYLGGAKIQFDRKHLEKNRDK--VA-----LGEIGSVFLNVTVDIEFQPL-KNGRLQTPLGQVLKVLK--KEW
LseCas12b EQQKK--REWFYDYST-----NLPHLGLTAGAKLQMDRNFINKRTQQIEE-----TGEIGKVFFNISVDVRPAVEV-KNGRLQNGLGKALTVLTHPDGT
BheCas12b MED-GS--LCVQYRDPGV-----DEPLRAELGGAKIQFDRRYLIRRSST--LS-----AGECGPVYLNVSVDVNPAPHRP-D-VQV-LQSAKLVSISR--DTN
BmeCas12b HIK-GK--QEISFSDYSS-----GIPLKGVLGGSRIQFNKXILENHREF--LT-----AGDIGPVFLNVIDVTPLEQEV-KNGRLQSPIGKALKIVP--SEY
BcaCas12b EDT-GKGKHNFSYHKGJ-----NYELKGTLCGARIQFDREHLRRQ--G--VK-----AGNUGRIFLNVTINIEPMQPFSSGNLQTSVGKALKVYV--DGY
BpaCas12b NDK-GK--QEIEFKDKGS-----GSTFSGHLGGAKLQIERGDLKEEKD--FE-----GGEIGSVYLNVIDIEFELQEV-KNGRLQSPYGQVLQLVRRPNEF
BpuCas12b EDF-GKGKHQFYDEAT-----GMELNGYLCGARIQFDRNYIRHSNQ--VA-----KANVGKIYFNMTLNIVPLQEQICRTGRLQTAVGKALSTYN--DDY
BhlCas12b Eek-GK--HAFTYKDESI-----KFPLKGTLCGARVQFDRDHLRRYPHK--VE-----SGNVGRIYFNMVTNIEPT-----ESPVSKSLKIH--DDF
BthCas12b **Eek-GK--HAFTYKDESI-----KFPLKGTLCGARVQFDRDHLRRYPHK--VE-----SNGVRIYFNMVTNIEPT-----ESPVSLSLKIHR--DDF**
BgeCas12b NDK-GK--QEIEFKDKGS-----GTFSGHLGGAKLQIERSVLEWKERK--FE-----EGEIGKAYLNVAIDFKPLQEV-KNGRVQAPYGQVLQLIRLPNAF
B-Gen.1 NPT-GK--QKITFQDYSS-----KEIIEGHGGAKLQIDRNFIRKSGRD--FE-----TGDFGPAFLNVLDLKPQEV-KNGRLQSPLGQALLVKSPPNDI
B-Gen.2 YAD-KK--QKVKYDYSS-----RFELTGVLCGAKIQFDRKHILKKAHR--LA-----EGETGPVFLNVDVVEPFLV-KNGRLRTPLGQVLQWNT--RDW

FIG.4
Continued

Consensus	PKVXXXKXXELXXWXXXXXX-----X-XXXGXXSLXXGLRWSXDLGXXRTSAAXSIFXVXXXX--PXX-XXXXXXYPXIGT-XLXAVHXXRSXXLLXLPGEXXX-KXXXXXXRXXXXX
BkaCas12b	RVTWN--YNKLSAYLEEHPD-----K-QIPGAPGLLSGLRWSVDLGLRTSASISVFRVAKKEEVEALGDGRPPHYYPHGTDDLVAHRSXHLIQMPGETET-KQLRKLREEROAVLR
BeyCas12b	RAFVH--FDKLSAYLAHPD-----E-GKLGSEGLLSGLRWSVDLGLRTSASISVFRVAPRDELAPNSKGRVPFYPYKGNLNLVAHRSXQLKLPGETES-KELRAIREERQRTLR
BacCas12b	RAFVH--FDKLSAYLAHPD-----D-GKLGSEGLLSGLRWSVDLGLRTSASISVFRVARKDELKPNSEGRVPFCPIEGNENVAHRSXQLKLPGETES-KDLRAIREERQRTLR
BmaCas12b	RVTVR--YGEIERVLAHPD-----T-GIPGSRGLTSGLRWSVDLGLRTSAAISVFRVAHRDELTPDAHGRQPFFPIHGMHDLVAHRSXHLIRLPGETES-KKVRSTIREQRDLRLN
BshCas12b	RVTWN--YNKLSAYLEEHPD-----K-QIPGALGLLFGLRWSVDLGLRTSASISVFRVAKKEEVEALGDGHPPHYYPHGTDDLVAHRSXHLIQMPGETET-KQLRKLREEROAALR
BaqCas12b	PKVTYKSEQLVEWIKASP-----Q-HSAGVESLASGFRWSIDLGLRAAAATSIFSVEESS--DK--NAADFXYWIEGT-PLVAVHQRXYMLRLPGEQVE-KQWMEKRDERFQLHQ
AacC2c1	RAFVH--FDKLSAYLAHPD-----D-GKLGSEGLLSGLRWSVDLGLRTSASISVFRVARKDELKPNKSGRVPFFPIKGNLNLVAHRSXQLKLPGETES-KDLRAIREERQRTLR
BsyCas12b	PKVTGYKPAELISWIQNSPL-----A-VGTGVNTIEAGMRWSVDLGLQRSAAAVSIFEVMRQK---PAE-QETKLFYPIAVT-GLYAVHRRSLLRLPGEKIS-DEIEQQRIRAHARS
Bv3Cas12b	SKVIDYKPKELMDWMNTGSA-----S-NSFGVASLLEGMRWMSIDMGQRTSASVSIFEVVKEL---PKD-QEQKLFYSINDT-ELFAIHKRSFLLNLPGEWT-KNNKQQRQERKRRQ
PteCas12b	PKVIDYKPKELTEWINVSSV-----T-GKVGVESTIEGMRWMSIDLGQRTSASVSIFEVVKEL---PKD-KEKMLYYNIKDT-ELFALHKSFLNLPGEVET-KRNRQKRRKRRKLL
BcoCas12b	PKVIEYKPSLENNWKETLDAQILSTE-QKKGIESLSAGMRIMTVDMGIRSSAAVSIFEIATER---PT--DSSKLCFRLPDN-DLYAVHCRSLLVNLPGCKPD-KRIREARELRTNQRY
LseCas12b	KIVTGWKAELQEKWGESGR-----V-SSLGLDSLSEGLRWMSIDLGQRTSATVSFEITKEA---PD--NPYKFFVQLEGT-ELFVHQRSEFLALPGENPP-QKIKQWREIRWKERN
BheCas12b	RIYLR--PENLSAYWKSQGD-----G-----TLPLRWMSVDLGVRSAAVITCRLEHRDSVSSG--RRTATYRIAGTDEFVAVQERAFLLRLPGECKG-TNEDAPLRDYYAQLG
BmeCas12b	PKVIDYKPKELIEWINNSA-----T-SKVGVESITEGMRIMSDMGQRTSASVSIFEVVKEL---PKD-KERRLFYNIKDT-DLYALHRRSFLNLPGEWT-KRISQEREERKNRL
BcaCas12b	PKVWNFKPKELTEHIKESEK-----NTLTGVESLPTGLRWMSVDLGLQRAAAISIFEVWSEK---PD---DNKLFYPVKDT-DLFAVHRTSFNIKLPGEKRT-ERRMLEQQKRQQAIR
BpaCas12b	PKVTYKSEELVEWIKASQ-----N-HSSGVESLESFGRWSIDLGLRTAAATSIFSVEESN---DA--NAAGFSYWIEGT-PLVAVHKSXYMLKLPGEQVE-KQVREKRDERQDQQR
BpuCas12b	LKWNFKPKELTELSQSKK-----LPLVKGPDLSIKVGLRIMSDVLGQRAAAVSFEVSDIK---PE---NKLYYPIKDT-ELFVAVHRSNKLAGEKRT-TKREKIQNKRDERIR
BhtCas12b	PKVWNFKPKELTEWIKDSKG-----KCLKSGIESLEIGLRWMSIDLGQRAAAASIFEVDQK---PD---IEGKLFPPIKGT-ELYAVHRASFNIKLPGETLV-KSREVLRKAREDNLK
BthCas12b	PKVWNFKPKELTEWIKDSKG-----KCLKSGIESLEIGLRWMSIDLGQRAAAASIFEVDQK---PD---IEGKLFPPIKGT-ELYAVHRASFNIKLPGETLV-<i>KSREVLRKAREDNLK</i>
BgeCas12b	PKVPTYKSEELVEWIKASP-----Q-HLSGVESLASGFRWSIDLGLRAAAATSIFSVEESS--DK--NATKLAYWIEGT-PLVAVHQRXYMLRLPGEQVE-QHWMEKRDERGDQHK
B-Gen. 1	PKVGYKPDALAWELEQASG-----E-ESLGSESLRQGRFWSIDLGVRSAAISVFSVKGEK---TR--EGDKVCYVGET-GLFVAVHDSRFLRLPGEESSE-KRVNVERDKRKTTERM
B-Gen. 2	PKVWDYKAKELSVLMENTQI-----G-NENGVSITIEAGMRIMSDLGQRTAAAVSIFEVISKK---PDE-KETKLFYPIADT-DLYAVHRRSLLRLPGEESISSKMMIEKRKERARIRS

FIG.4
Continued

Consensus	XXR/QXXXLXXLR/XXXXXXXXXXR/XXXXXXXXXXELXXLXXXX-XXXXXXWXXXVXXXHR/LEXXXGK/VXXWRK/XXX--G-R-----XXXXGS
BkaCas12b	PLFAQLALLRLLVRCGAA-DEIRITRSWQRLTKQGREFTKR-LTPSWREALLELTRL EAYGCRVPDDEWSRIVDRTVIALWRMGKQVRDWRKQVKS---G-AKVVKVGYQLDWWGGNS
BeyCas12b	QLRTQLMYLRLLVRCGSE-DVRRRERSWAKLT EHPMDGSES-ITSDWREAFVNELQKLMPLHGVCSDEKMEAVYESVRRWRHMGKQVRDWRKQVRS---G-ERPKIRGYKKDWWGGNS
BacCas12b	QLRTQLAYLRLLVRCGSE-DVGRRERSWAKLIEQPMID-ANQ-MTPDWREAFEDELQKLSLYGICGDREWTEAVYESVRRWRHMGKQVRDWRKDVRS---G-ERPKIRGYQKDVVGGNS
BmaCas12b	RLRSQMASLRLLVRTGVL-DEGKRDNRWELQSSMERGGER-MPSDWMDL FQAQVRYLAQHR-DASGEAWGRWQAAVRTLWRQLAKQVRDWRKEVRR---NADKVKIRG IARDVPGGHS
BshCas12b	PLFAQLAVLRLLVRCGAA-DEIRITRSWQRLTKQGREFAKR-LTPSWREAL ESELTRL EAYGRVPDDEWSRLVDKTVTALWCRMGKQVRDWRKQVKS---G-AKVVKRYQLDWWGGNS
BagCas12b	RVKFQIRVL AQIMRMANKQY-GDRWDELDSLKQAVEQ-KKSPLDQTDRTFEGIVCDLTKVL-PRNEADWEQAVQIHRKAEVYGKAVQAWKRF AAD--E-R-----KG IAGLS
AacC2c1	QLRTQLAYLRLLVRCGSE-DVGRRERSWAKLIEQPVDAANH-MTPDWREAFENELQKLSLHGICSDKEIMDAVYESVRRWRHMGKQVRDWRKDVRS---G-ERPKIRGYAKDVVGGNS
BsyCas12b	LVRVQIRLLADVLRLHTRGTAEQRRAKLDELLATLQT-K----QELDQKLWQTELEKLFDYI-HEPAERWQQALVAHRTLEPVGQAVRHWKSLRI---D-R-----KGLAGMS
Bv3Cas12b	FVRSQIRMLANVLRL ETKTTPDERKKA I HKLMEIVQS-YDS-WTASQKEVMEKELNLLTNMA-AFNDEIWKESLVELHRIEPIVGVQIVSKWRKGLSE---G-R-----KNLAGIS
PteCas12b	FIRSQIRMLASVLKLETKNTPDERKKA INKLVEIVDS-Y-E-WTESEKEIWNSEFEYL TNKA-VFKQE IWRESL IKSHRMEPHVGQLVSEWRKSLNE---G-R-----RNLAGIT
BcoCas12b	GVRQLIRMLSNIQRLHSRETEAERLKA VTDLEQALWQ-NEN-VTQVERDQLIPVIRELLQRV-TADPDWTEQIEKTYRELERLVGAALTKWKXSGFP---G-R-----RNLAGLS
LseCas12b	RIKQQVDQLSAILRLHKKVNERIQAIDKLLQKVAS-W-Q-LNEE IATAWQALSQLYSKA-KENDLQWNGQAIKNAHHQLEPVGKQISLWRKDLST---G-R-----QG IAGLS
BheCas12b	TIRQGIQLRSLRLCDTKTPDERQEA LHGLAQSLP-----SCAWKDELHPHLVMLQGCV-HDSVDNWKQKVISVHRQMERILGHAVREWKVARKN---A-GKPP I-----RRGAGGLS
BmeCas12b	IVRAHIRMLASVLKLGTKKTPDERKKAMKLL ENIEL -NNL -WSVADKKAWITREFNELLNMA-FYNEE IWKENV IQLHRRMEPVGVQIVSKWRRLSD---G-R-----RNLAGIS
BcaCas12b	DLSRKCLKFLKNVLNMQKLEKTDEREKRVNRWTKDRER-----EEENPVVYQEFEMISKVL-YSPHSWWDQLKSIHRKLEEQLGKEISKWRQSI SQ---G-R-----QG VYGIS
BpaCas12b	RVRFQIRILSQVIRMAKKQN-RERADEL D HLSQALEK-QKSLLDQTDRTFWNGIVCDLTDAL-REKEGGWEQAVQIHRKAEHVGVVQAWKRFADAD--E-R-----KG IAGLS
BpuCas12b	ELSRKLTFLRNILNLQLVENVEERKKVGRWLDRED-----STQKELYEENQSKLKNVL-YSPQDVWIKTLKEITYSKLEHSIGREIHEWRSTISD---D-R-----EGVYGIS
BhiCas12b	LMNQKLNFLRNVLHFQQFEDI TEREKRVTKWISROEN-----SDVPLVYQDEL I QIRELM-YKPYKDWAF LKQLHKLRLVEIGKEVHWKRSLS D---G-R-----KGLYGIS
BthCas12b	LMNQKLNFLRNVLHFQQFEDI TEREKRVTKWISROEN-----SDVPLVYQDEL I QIRELM-YKPYKDWAF LKQLHKLRLVEIGKEVHWKRSLS D---G-R-----KGLYGIS
BgeCas12b	RVRFQIRRLAEIIRLANKQY-GDRWDELNRLDEAVSK-EKSPLDQADR TFWEGIVSDLTAL-PLNDADWTEAVVQIHRKAE LVGVVQAWKRFNAD--E-R-----KG IAGLS
B-Gen. 1	QIRYHIRT LARVLRLANKATPMDR I KAVQDVNLDES-TRF -MNDHDHVVYNHALET LRTYA-PDHQG IWECEQV IAAHRQLEHHGV I VGEWRKNMGK---D-R-----RGTVGLS
B-Gen. 2	LVRVQIRLLSEVLRLHTGTAEQRRFKLDELLVSIQK-K----LELDQSEWISLEKLFDYI-DESAEKWKEALWAHRTLEPIWEAVRNWKSLSKENKD-R-----RRIAGIS

FIG.4
Continued

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Consensus XXXIEELXXRKLLXSHSXRXRXPCEVXRXEXXXXFAXXXLXHIXNK'DRLK'LANIWMTALGYXD/- ---- XXXWAXYPACQXILFELSXYRFXXDRSXXENSXLMKWXHRXIP
BkaCas12b LAQIDYLEQQYKF LRWSFFARASGLVRADRESHFAVALRQHJENAKDRCLKKLADRIIMEALGYVVEASG--PREGQWTQAHPQCQLITILEEL SAYRF SDDRPPSENSKLMAWGHRGIL
BcyCas12b IEQIEYLERQYKFLKSWSFFGKYSGQVIRADKGSRFAITLREHIDHAKEDRLKKLADRIMEALGYVVALDDEGKGWKWAKYPPCQLITILEELSEYQFNDRPPSENINQLMQWHSRGVF
BacCas12b IEQIEYLERQYKFLKSWSFFGKYSGQVIRAEKGSRAITLREHIDHAKEDRLKKLADRIMEALGYVVALDDEGKGWKWAKYPPCQLITILEELSEYQFNDRPPSENINQLMQWHSRGVF
BmaCas12b LAQIDYLERQYRFLRSWSAFSVQAGQVVAERDSRF AVALREHIDNGKKDRCLKKLADRIIMEALGYVYTDG--RRAGQWAQVPPCQLVLLEELSEYRFSNDRPPSENSQLMWSHRGVL
BSnCas12b LAQIDYLEQQYRFLRWSSFFARASGLVRADRDSSHFAVALRQHJENAKDRCLKKLADRIIMEALGYVVEASG--PREGQWTQAHPQCQLITILEEL SAYRF SDDRPPSENSKLMAWGHRGIL
BaqCas12b MNNIEELEGRKLL I SNSSRRTRNPQE VNRF ERGHTSHORLL THIQNVKEDRLKQL SHA IWMTALGYVDE----RKQEWCAEYPAQCVILFENLSQYRSNLDRSTKENSTLMKWAHSRIP
Aac2C1 IEQIEYLERQYKFLKSWSFFGKYSGQVIRAEKGSRAITLREHIDHAKEDRLKKLADRIMEALGYVVALDE--RGKGWKWAKYPPCQLITILEELSEYQFNDRPPSENINQLMQWHSRGVF
BSyCas12b MNNIEELEETRLL IAWSKHSRVPGEPNRLDKEE TFA PQQL QHIQNVDRLKOMANILVM TALGYKYDE----AEQKWKEAYPAQMILFEDLSRYRF ALDRPRENNRMLMKWAHSRIP
BV3Cas12b MNNIDELEDTRLL I SNKSRSTPTGEANRIETDEPF GSSLHQHIQNVKDDRLKOMANILIM TALGF KYDKEEKDYKRWEKTYPACQIILFENLNRYLFNLDRSRENRLMKWAHSRIP
PteCas12b MNNIEELEDTRLL I SNKSRSTPTGEANRIINDEPF GA KLEHIQNVKDDRLKQLANILVM TALGKYDYDKEESRDKRWEKYPACQVILFENLNRYLFSLDRSKRENRLMKWAHSRIP
BcoCas12b MNNIEELESRLM L I SNKSRSPRPQEKNHLEKEQF AGGLTHIQEVKNDRLKOMANILVM TALGKYKYD-----KHAKWASYPACQIILFEDLSRYRMKQDRSMENSLLMKWAHSRIP
LseCas12b LWSIEELEATKLL TRWSKRSREPVGWKRITERFTFAKOIQHHNQVENRLKQLANILVM TALGKYKYDQ-----EQKKWIEVPACQVILFENLSRYRFSYERSRRENKKLMEWSHRIP
BheCas12b LPRIRIQLEQRRTLVAVSNHAREPGQVVR IKRG TQAQWLVERVNHLKEDRLKKLADLLIM TALGYVVE TK--PSGHKWDKRYPPCQIILMEDLSRYRF QSDRPPSENSQLMAWSHRILL
BmeCas12b MNNIDELEDTRLL I SNKSRSTPTGEANRIENDEPF GTNLLEHIQNVKEDRLKOMANILVM TALGKYDYDEGEPNKDRIWEKTYPACQVILFENLNRYLFNLDRSRENRLMKWAHSRIP
BcaCas12b LKNIEDIEKTRLL FRWSMRPENPEVKQLQPGRFA IDQQNHLNHLKDDR IKKANQI VM TALG RYDYG-----KRKKWTAKHIPACQLVLFEDLSRYAFYDERSLENRLMRWSRREIP
BpaCas12b MMSIEELDSLRLKLL I SNSSRRTRNPQENRFEQGHTSHORLL THIQNVKEDRLKQL SHA IWM TALGYVDE----KKLEWF AKYPACQVILFENLSQYRSHMDRSTKENSTLMKWAHSRIP
BpuCas12b LKNIEEFERSRLLL SNWSNRSTEPGP KRLEKGRFA IDQQVHLNDLKDDR IKKMANTLVM TALGKYRG-----KHKRWWAERPACQVILFEDLSYCGFREERSQENSKLRWSRREIP
BhiCas12b LKNIDEIDRTKFLLRWSLRPTPEGVRRLEPGQRF AIDQLNHLNALKEDRLKKMANIIMHALGCYDY-----RKKKWOAKNPACQIILFEDLSYNPYEERSFENSKLMKWSRREIP
BthCas12b LKNIDEIDRTKFLLRWSLRPTPEGVRRLEPGQRF AIDQLNHLNALKEDRLKKMANIIMHALGCYDY-----RKKKWOAKNPACQIILFEDLSYNPYEERSFENSKLMKWSRREIP
BgeCas12b MMSIEELDGLRLL I SNSSRRTRNPQENVNREFEHTGHKRL THIQNVKDRLLKQVSHA IWM TALGI TYDE----KKQKWCAKYPACQVILFENLSQYRSNLDRSAKENSTLMKWAHSRIP
B-GEn_1 MDNIEELEMRRLL I SNSSRRARYPREAKFPQVNE SNP VHLRH IQNLKEDRLKQLANILVM TALGYVDS-----KEKKWKAAYPACQLITILEELQRYRFLDRSARENSQLMKWAHSRIP
B-GEn_2 IWSIEELEETRLL IAWSKHSRPEGIPKRLEKETFAPEHLQHIQNVDRLKOMANILFM TALGKYKYDE----GNKRWEAYPACQVILFEDLSRYRF ALDRPRENNRMLMKWAHSRIP

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FIG. 4
Continued

Consensus	XXVXXEXXGLQVGDVVA\FSSRFHAKTGAPGIRCXXVXXDLX-----XXX--XXXXLXXXXFXXE--XXXXLXXGDXXPXXGGEFVTLXX-X-----XXXXXXXXHADIN*
BkaCas12b	EELVNAQVHDLVGVTVAAAFSSRFDARTGAPGVRCRRVPARFVG-----ATVD--DSLPLWLTEFLDKHRLKNNLRPDDVIPGEGEFLVSPCG-E-----EAARVRQVHADIN
BeyCas12b	QELLNQAQVHDLVGVTVAAAFSSRFDARTGAPGIRCRVPARCVK-----EHP--ESFPWMLNRFVAEQQLDPSLLRADDLIPGEGEVFVSPTS-T-----KEGDFHQIHADLN
BacCas12b	QELLNQAQVHDLVGVTVAAAFSSRFDARTGAPGIRCRVPARCAR-----EQNP--EPFPWMLNKFVAEHKLDGCPLRADDLIPGEGEFLVSPFS-A-----EEGDFHQIHADLN
BmaCas12b	EELIHQAQVHDLVGVTVAAAFSSRFDARTGAPGIRCRVPSPILK-----DAP-----SIP1WLSHYLKQTERDAAALRPGELIPTGDGEFLVTPAG-R-----GASGVRVHADIN
BshCas12b	EELVNAQVHDLVGVTVAAAFSSRFDARTGAPGVRCRRVPARFVG-----ATVD--DSLPLWLTEFLDKHRLKNNLRPDDVIPGEGEFLVSPCG-E-----EAARVRQVHADIN
BaqCas12b	KYVHMQAEPYGTQIGDVRAEYSSRFYAKTGTGPGIRCKKVRGQDLQ-----GRRFENLQKRLVNEQFLTEE--QVKQLRPGDIPDDSGELFMTLTD-G-----SGSKEVWFLQADIN
AacC2C1	QELINQAQVHDLVGVTVAAAFSSRFDARTGAPGIRCRVPARCTQ-----EHP--EPFPWMLNKFVVEHTLDACPLRADDLIPGEGEFLVSPFS-A-----EEGDFHQIHADLN
BsyCas12b	RLVYLQGEFLGIVQGDVVSAYTSRFHAKTGAPGIRCHALKEEDLQ-----PNSY--VVKQLIKDGFIRE--QTSGLKPGQIPVWSGGELFVTLAD-R-----SGSRLAVIHADIN
Bv3Cas12b	RTVSMQGEFMFGLQVGDVRSEYSSRFHAKTGAPGIRCHALTEEDLK-----AGSN--TLKRLIEDGFINES--ELAYLKGDIPSGGELFVTL SK-RYKSDNNELTVIHADIN
PteCas12b	RTVMMQGEFMFGLQVGDVRSEYSSRFHAKSGAPGIRCHSLNDEDLK-----EESF--KLKHLIETGFISEE--EISSLKKGDI VPMWPGGELFVTL SK-PYKK-GKDIELTVIHADIN
BcoCas12b	RHTWMQGEFPFGLQVGDVRSEFSSRFHARTGAPGIRCHVWTEKDIN-----NPL--FKDQLLRKNFLKEE--QFQTLQPGDIPVMQGGELFVTL SG-P-----NSQDVILIHADIN
LseCas12b	KLVMQGEFLGLQVADVAAAYSSRYHGRGAPGIRCHALTEADLR-----NETN--ITHELIEAGFIKEE--HRPYLQGGDLVPMWSGGELFATLQK-P-----YDNPRIILTIHADIN
BheCas12b	EILKLQADLHKLIVGTVFPAFSSRFDAQSGAPGVRCRSVKQDIE-----NAA--QGGKWLARELQRLNWTLEWLQPNDLIPTGDGELFVTPACCD-----RQKGKIVHADLN
BmeCas12b	KTVMQGEFMFGLQVGDVRSEFSSRFHAKTGAPGIRCRALTEEDLK-----DGSY--VLNQLIESNFINEN--EINHLRKGDI VPMWEGGELFATL SK-PYKESDDNELTVIHADIN
BcaCas12b	KQVAQIGGLYGLLVGEVGAQYSSRFHAKSGAPGIRCRVKEHELYITEGGQKVRNQK-----FLDSLVENNIIEPD--DARRLEPGDLIRDQGGDKFATLDE-----RGELVITHADIN
BpaCas12b	KYVHMQAEPYGTQIGDVRAEYSSRFHAKTGTGPGIRCKMWSGHDLQ-----GRRFENLQKRLISEQFLTEE--QVKQLRPGDIPDDSGEWFVTLTN-G-----SGDKEVWLLQADIN
BpuCas12b	RQVALQGEIYGLQVGDIGAQFSSRFHAKTGAPGIRCHKTEMMDQ-----NDW--MKKDLIQRGFIKEE--QIELIKAGDYIPSKGGEKFATLSR-----DRSLILTDADIN
BhiCas12b	RQVALQGEIYGLQVGEVGAQFSSRFHAKTGSPGIRCSVWTKELQ-----DNR--FFKNLQREGRLTLD--KIAVLKEGDLYPDKGGEKFISLSK-----DRKCVTTIHADIN
BthCas12b	RQVALQGEIYGLQVGEVGAQFSSRFHAKTGSPGIRCSVWTKELQ-----DNR--FFKNLQREGRLTLD--KIAVLKEGDLYPDKGGEKFISLSK-----DRKLVTTIHADIN
BgeCas12b	KYVHMQAEPYGTQIGDVRAEYSSRYAKTGTGPGIRCKKLREHDVK-----GWRDLHKKRLVNEQFLTEA--QVEQLKAGDIIPDDSGELFMTMTD-G-----SGGKEIVFLQADIN
B-Gen. 1	KYVMMQGEPYGLQIGDVWAGFTSRYHAKTGAPGIRCKALTEKDFQ-----QGR--LLESVAEGMFTLQ--EVGTLKPGDIPVAEGGELFVTLAD-D-----SG-DRIVITHADIN
B-Gen. 2	RLTYMQAELFGIVQGDVVSAYTSRFHAKTGAPGIRCHALTEADLQ-----SNSY--VNQLIKDKFIQDN--QTEILKAGQIPVMQGGELFVTFAD-R-----SGASLAVIHADIN

FIG.4
Continued

Consensus AAQNLQKRFWXXXX-XXXXRV/CXXXXXX-XXXXL/PXXXX-XXXXG--KG'-FVXXXX-XXXXVWXXXXK'K'-XXXX-XXXXXXX-E'X'X'-----XXXXXEA'EXX
BkaCas12b AAQNLQRRLWQNFDTITELRLCDVKMG-EGTVLVRVNN--AR---AKQLFG--KKV-LVSQD---GVTFERSQ-TGGKPH--SEKQ---TDL-----TDKE-----LELIAEADear
BcyCas12b AAQNLQRRLWSDFDISQIRLRCRGEVD-CEPVLIPRLTG--KR---TAESVR--NKV-FYSNT---GVTYERER-GKKRGR--GLPL---EEL-----SEEE---AELLVEADear
BacCas12b AAQNLQRRLWSDFDISQIRLRCWGEVD-CEPVLIPRTTG--KR---TADSYG--NKV-FYTKT---GVTYERER-GKKRRK--VFAQ---EEL-----SEEE---AELLVEADear
BmaCas12b AAQNLQRRLWENFDLSDIRVRCRRREGKGTWLIPLRLTN--QR---VKERYS--GVI-FTSED---GVSTVGDA-KTRRRS--SASQEGDDL-----SDEE---QELLAEADear
BshCas12b AAQNLQRRLWQNFDTITELRLCDVKMG-EGTVLVRVNN--AR---AKQLFG--KKV-LVSQD---GVTFERSQ-TGGKPH--SEKQ---TDL-----TDKE-----LELIAEADear
BagCas12b AAQNLQKRFWQRYN-SLFV/SCRVIIRD-EEEYLVPKTKS-----VQAKLG--KGL-FVKSD-TAWKDVVWDSQAKLKGG--TFTT---EESPEQ-LEDF---QEIEEAEAK
AacC2c1 AAQNLQRRLWSDFDISQIRLRCWGEVD-GELVLIPLRLTG--KR---TADSYS--NKV-FYTNT---GVTYERER-GKKRRK--VFAQ---EKL-----SEEE---AELLVEADear
BsyCas12b AAQNLQKRFWQNT-EIFRVPCKVTTSG-----LIPAYDK-----MKLFG--KGY-FAKINQ-TDTSEVVVWEHSAKMGK--TTPA---DPAEEGVF-DESL---TDEMEELDSQ
Bv3Cas12b AAQNLQKRFWQNS-EVVRVPCQLARMG-EDKLYPKSQT--ET---IKKYFG--KGS-FVKNT---EQEVYKWEKSEKMKIK--TDIT---FDLQDLG-FEDI---SKTIELAQEQ
PteCas12b AAQNLQKRFWQNS-EVVRIPQCLEKAG-DDEFFIPKSQT--EI---VKKYFG--KGR-FVKIND---KKEVYNWEESEKMKIK--TEST---ITLQDLG-FEDI---FQTLLEAQEQ
BcoCas12b AAQNLQRFWTRNQ-EIFRIVCQAVEYE-GNAFVPKYE-----KRLG--KGL-LVKRF-A---DEQVYKWDQAQAKLSK--KALP---DQSYSED-GEES---FEGLEAEVR
LseCas12b AAQNLQKRFWHP-S-MMFRVNCESVMEG-EIVTVPKNKT-----VHKQGG--KTRFVKVE---GSDVYEWAKWSKNRK--NIFS--S-----ITERKP
BheCas12b AAQNLQRFWGCHAESLCRVTCWVERD-GRRYAVPRISN--AFADSFYKVG--QGV-FVSTD---EEDVYRMWGEKISSR--GRSR--GRT-----SDEEAEATWIDEAREEQ
BmeCas12b AAQNLQKRFWQNS-EVFRVSCQLAKG-DDEVYPKSES-----VKYLG--KGG-FVKVSD---KQEVYNLEKSDKIKIKTGST---IELQDLG-LGEI---AQTLLEAEQ
BcaCas12b AAQNLQKFWTRTH-GLYRICESREIK-DAWLVPSCDQKEK---MENLFG--IGY-LQPFKQ---ENDVYKWKGEKIKGK--KTSS---QSDDKELV-SEIL---QEASVMADELK
BpaCas12b AAQNLQKRFWQRYN-ELFKVSCRVLIRG-EEEYLIPKTKS-----VQAKLG--KGL-FVKKTD-TVIKDVVWDSQAKLKGG--TFTT---EESPEQ-LEDF---QEIEEAEAK
BpuCas12b AAQNLQKFWTRNH-GFFRISCVYIQSD-DDQILVPKEYTK--KR---LQELYGSSGY-FIMIDD--NKGEVYKWSRDKLKQK--VSLK--SKRTSEE--TEAM--NDJFEIAEIS
BhiCas12b AAQNLQKFWTRTH-GFYKYCKAYQVD-GQTVYIPESDQKQK---IIEEFG--EGY-FIL-----KDGVEYWNAGKLIK--KGSS---KQSSSELVDSIL---KDSFDLASELK
BthCas12b AAQNLQKFWTRTH-GFYKYCKAYQLD-GQTVYIPESDQKQK---IIEEFG--EGY-FIL-----KDGVEYWNAGKLIK--KGSS---KQSSSELVDSIL---KDSFDLASELK
BgeCas12b AAQNLQKFWQRNS-ELFKVSCRVIIRD-EAEYLVPQAKK-----VQELG--KGV-FVKSD-TAWKEVYVWDSQAKLKGG--TFTT---EESPEQ-LEDF---QEMIEEAEAK
B-Gen.1 AAQNVQKRFWLANS-ERFRVACRSVQIA-SQECFIPSSS-----VAKMKG--KGV-FVRDFSFHKDMEVYHNNQVKLTAK--NVPT---DHSDDLQD-LQDY---QAILEEARESS
B-Gen.2 AAQNLQKRFWQNS-EVFRVPCKVWKG-----LVPVYEK-----MRKLG--KGL-FVNIDD-PESKEVYRWEHSTKMKSK--TTPV---DLESEDID-HEE-----LSDEWEDMQ

FIG.4
Continued

Consensus	XXXXTLFRDPGXXFXXXXWXXQXFWXXVXXXXIXXXXIXXXXX-----XXXX
BkaCas12b	AKSVLFRDPGSHIG-KGHWIRQREFWSLVKQRIESHATAERIRVRG-V-----GSSLD
BcyCas12b	EKSVLMRDPSCIIN-RGDWTTQREFWTLVNQRIEGLVKQIRSRG-S-----ACENTGEI
BacCas12b	EKSVLMRDPSCIIN-RGDWTRQKEFWSMNQRIEGLVKQIRSRV-R-----LQESACENTGDI
BmaCas12b	ERSVLFRDPGCVN-GRWTAQRAFWGWHNRITETLLAERFSVSG-A-----AEKVRG
BshCas12b	AKSVLFRDPGSHIG-KGHWIRQREFWSLVKQRIESHAAATIRVRG-V-----GSSLD
BagCas12b	GTYRTLFRDPGCVFFPESWYPQKDFWCEVKRKL YGKL RERFL TK-----AR
AacC2C1	EKSVLMRDPSCIIN-RGNWTRQKEFWSMNQRIEGLVKQIRSRV-P-----LQDSACENTGDI
BsyCas12b	EGYKTLFRDPGFFWSSDRWLPQKEFWFKRRRIEKKLREQ-----Q
Bv3Cas12b	KKYLTMRDPGCVFFNNE TWRPQKEYWSIVNNI IKSKLKKKILSN-----KVLEL
PteCas12b	KKYSTLFRDPGCVFFNEKNRPQKEFWWSIVNNI IRSSLKKKILKN-----KVEV
BcoCas12b	GEYKTLFRDPGTFPSPDTWRPQVEFWGIVKARLEKLLREKILT-----GR
LseCas12b	PSSMILFRDPGTFKEQEWEQKTFWCKVQSMIQAYMKKTIVQR-----MEE
BheCas12b	GKVIALFRDASQIHH-GGDWLVAKVFWGWERLVTARLLSRMSERE-A-----AAHKE
BmeCas12b	KKYVTLFRDPGCVFFNNG TWRPQKEFWWSIVNNI IRNCLKKKILKN-----KVEV
BcaCas12b	GNRKTLFRDPGYVFPKDRWYTGGRYFGTLEHLLKRKLAERLFDG-GSSRRGLFNGTDSNTNVE
BpaCas12b	GTYRTLFRDPGCVFFPEFVWNTQKDFWSEVKRRL YGKL RERFLMK-----TR
BpuCas12b	GESITLYRDPGCMFPSDLWYTGGRYFGTIEGRICKQLKQRIQGG-L-K---RPIAEDDEEWDLF
BhiCas12b	GEKLMLYRDPGCVNFPSDKWMAAGVFFGKLERILISKLTNQYSTST-I-----E--DDSSKQSM
BthCas12b	<u>GEKLMLYRDPGCVNFPSDKWMAAGVFFGKLERILISKLTNQYSTSTIE-----DDSSKQSM</u>
BgeCas12b	GTYRTLFRDPGCVFFPDFVWNTPKDFWCEVKRKL YGKL RERLL TK-----VR
B-Gen.1	SSYKTLFRDPGCVFFPDDVWPQNIYWREVKKTIITALLRKRIMS-----T
B-Gen.2	EGYKTLRDPGFFWSSDSWIPQKDFWIRVKSRTGKSLREQI-----R

FIG.4
Continued

20/22

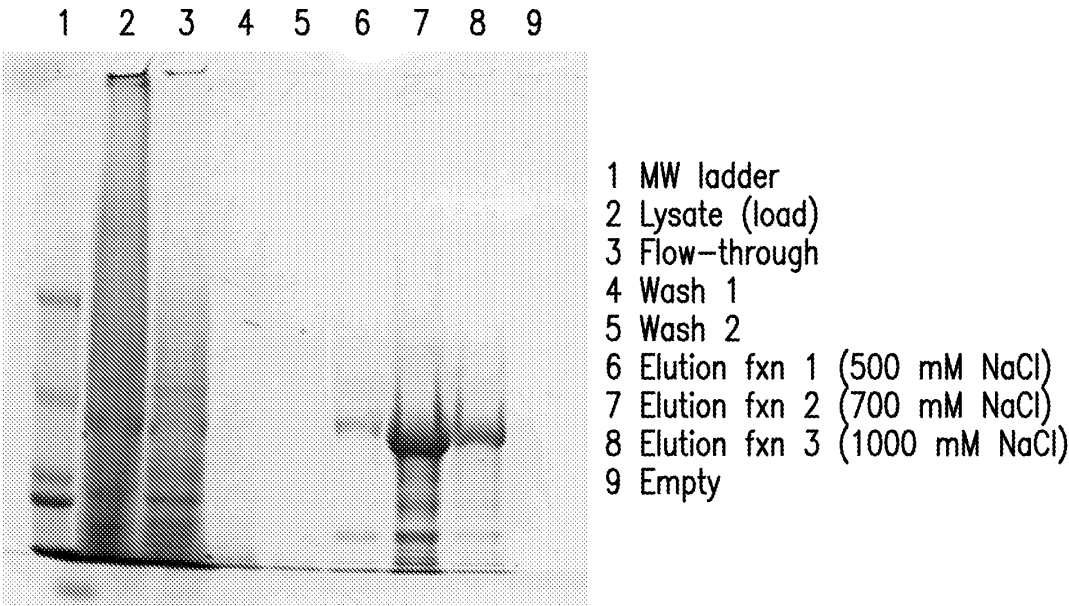


FIG.5

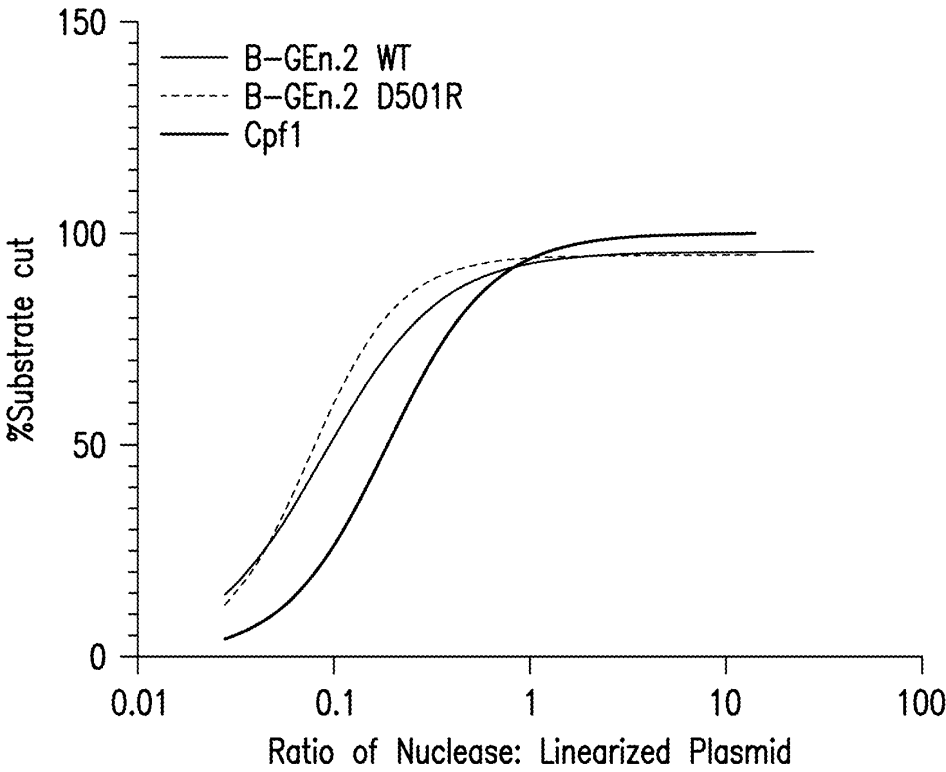


FIG.6

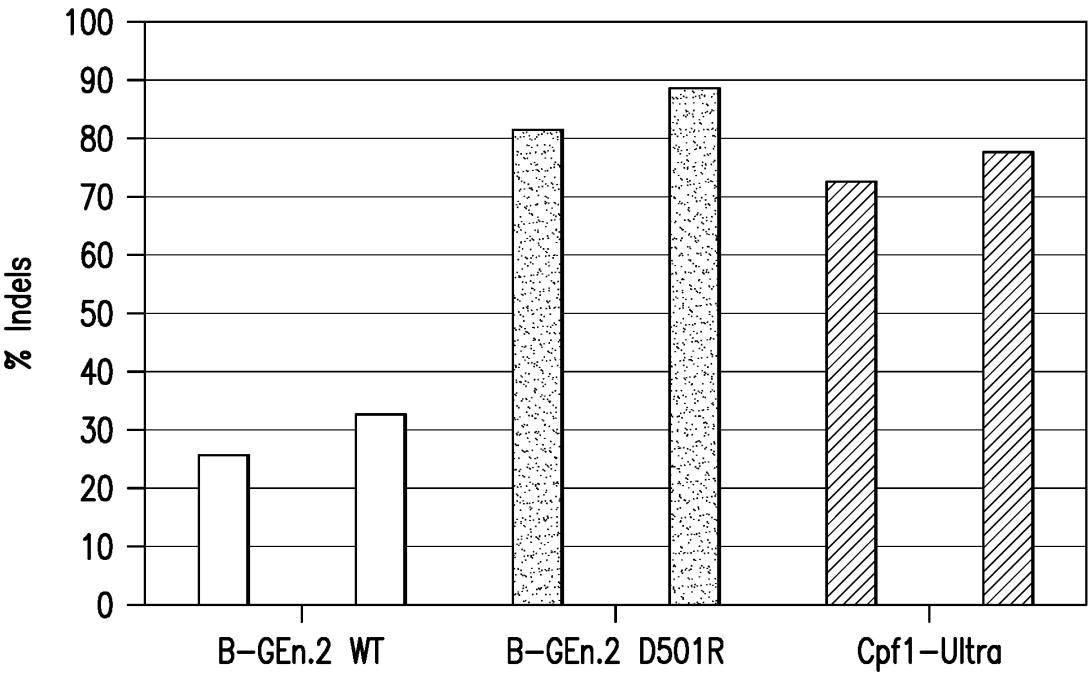


FIG. 7

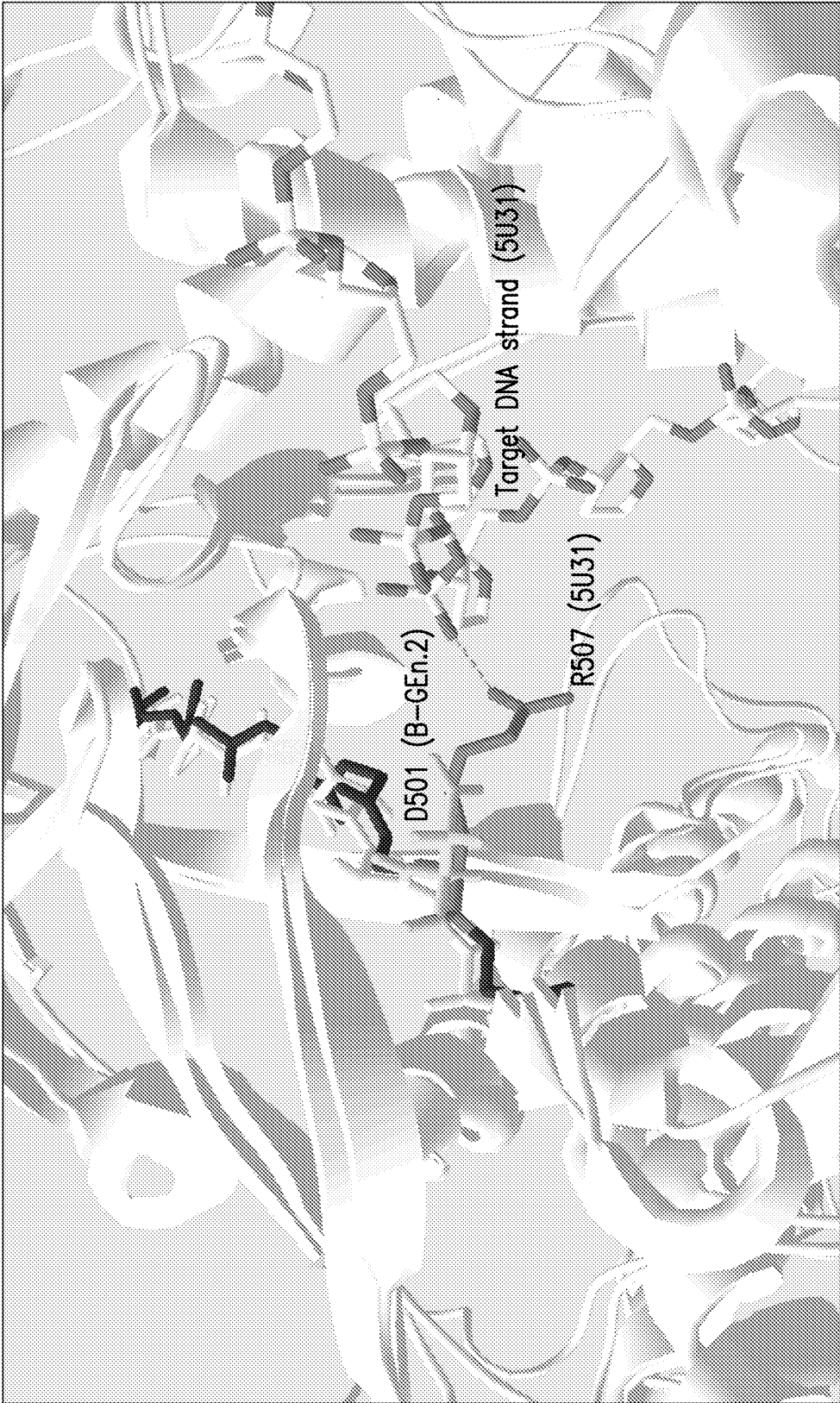


FIG.8