

IMPROVED DETECTION ASSAYS

Cross Reference to Related Applications

[0001] This application claims priority to each of U.S. Provisional Patent Application Nos. 62/966,527; filed January 27, 2020; 62/967,536; filed January 29, 2020; 62/970,159; filed February 4, 2020; 63/038,710; filed June 12, 2020; 63/139,267; filed January 19, 2021 the entire contents of each of which are hereby incorporated by reference.

Background

[0002] A variety of clustered regularly interspaced short palindromic repeats—CRISPR-associated (“Cas”) proteins have been discovered to have a collateral cleavage activity useful in detection (e.g., diagnostic) systems to detect particular nucleic acids of interest. *See, for example, review by Sashital Genome Med* 2018:10, 32.

Summary

[0003] The present disclosure provides improved detection (e.g., diagnostic) technologies that utilize Cas-protein collateral activity.

[0004] Among other things, the present disclosure identifies the source of a problem with use of certain Cas enzymes in certain collateral activity assays. For example, the present disclosure documents that certain such assays include a step that involves incubation at an elevated temperature for a period of time, and various Cas enzymes may be insufficiently stable to maintain a sufficient level of activity (e.g.,

collateral activity) under such conditions. In many embodiments, such a step may be or comprise a nucleic acid extension and/or amplification step.

[0005] Alternatively or additionally, the present disclosure provides the insight that particularly desirable embodiments of various collateral activity assays are those that can be performed in a single reaction vessel (i.e., so-called “one pot”) assays. The present disclosure appreciates that Cas enzymes whose activity (e.g., collateral cleavage activity) is insufficiently stable to maintain sufficient activity through any and all elevated-temperature step(s) (which may be or include, for example, one or more nucleic acid extension and/or amplification step(s)) may not be useful in such one-pot assays. The present disclosure furthermore documents that certain Cas protein(s) (e.g., Cas13 and Cas12) are insufficiently stable at relevant temperature(s), e.g., at temperatures at which nucleic acid extension and/or amplification reactions are typically performed (e.g., above about 60-65 °C).

[0006] The present disclosure encompasses the recognition that thermostable variants of various Cas proteins (e.g., Cas9) have already been described and/or otherwise made publicly available (see, for example, Mougiakos et al. *Nat Commun.* 8:1647, 2017). Those skilled in the art are able to compare such thermostable variants with related non-thermostable homologs (e.g., orthologs), in order to assess sequence changes and/or elements that may be necessary and/or sufficient to achieve thermostability, and furthermore can identify such sequence changes and/or elements in other homologs (e.g., orthologs) and/or can introduce them thereinto. Still further, those skilled in the art are well aware of potential sources of naturally-occurring thermostable Cas proteins (e.g., in microbes that survive in elevated temperature conditions, such as in sea vents, or are otherwise thermophilic). Thus, those skilled in the art, reading the present disclosure, could readily identify and/or develop appropriate thermostable Cas proteins for use as described herein.

[0007] In some embodiments, a useful thermostable Cas protein is a Cas12 or Cas13 homolog (e.g., ortholog). In some embodiments, a useful thermostable Cas protein is a Cas enzyme comprising an amino acid sequence having 80%, 85%, 90%, 99% or 100% sequence identity to any one of SEQ ID Nos. 1-283.

[0008] Alternatively or additionally, in some embodiments, a useful thermostable Cas protein performs (e.g., its collateral cleavage activity functions sufficiently) at temperatures above about 50 °C; in some embodiments, above a temperature selected from the group consisting of about 55 °C, about 56 °C, about 57 °C, about 58 °C, about 59 °C, about 60 °C, about 61 °C, about 62 °C, about 63 °C, about 64 °C, about 65 °C, about 66 °C, about 67 °C, about 68 °C, about 69 °C, about 70 °C, about 71 °C, about 72 °C, about 73 °C, about 74 °C, about 75 °C, about 76 °C, about 77 °C, about 78 °C, about 79 °C, about 80 °C, about 81 °C, about 82 °C, about 83 °C, about 84 °C, about 85 °C, about 86 °C, about 87 °C, about 88 °C, about 89 °C, about 90 °C, about 91 °C, about 92 °C, about 93 °C, about 94 °C, about 95 °C, about 96 °C, about 97 °C, about 98 °C, about 99 °C, about 100 °C, or combinations thereof. In many embodiments, useful thermostable Cas protein performs (e.g., its collateral cleavage activity functions sufficiently) at temperatures above about 60 °C.

[0009] In some embodiments, a useful thermostable Cas protein performs (e.g., its collateral cleavage activity functions sufficiently) within a temperature range at which nucleic acid extension and/or amplification reaction(s) are performed; those skilled in the art are well familiar with various such reactions and the temperature ranges at which they are performed. In some embodiments, such a temperature range may be above a temperature selected from the group consisting of about 60 °C, about 61 °C, about 62 °C, about 63 °C, about 64 °C, 65 °C, about 66 °C, about 67 °C, about 68 °C, about 69 °C, about 70 °C, about 71 °C, about 72 °C, about 73 °C, about 74 °C, about 75 °C, about 76 °C, about 77 °C, about 78 °C, about 79 °C, about 80 °C, about 81 °C, about 82 °C, about 83 °C, about 84 °C, about 85 °C, about 86 °C, about 87 °C, about 88 °C, about 89 °C, about 90 °C, about 91 °C, about 92 °C, about 93 °C, about 94 °C, about 95 °C, about 96 °C, about 97 °C, about 98 °C, about 99 °C, about 100 °C, or combinations thereof. In

some embodiments, a temperature range may be about 60 °C to about 90 °C. In some embodiments, a temperature range may be about 60 °C to about 80 °C. In some embodiments, a temperature range may be about 60 °C to about 75 °C. In some embodiments, a temperature range may be about 65 °C to about 90 °C. In some embodiments, a temperature range may be about 60 °C to about 80 °C. In some embodiments, a temperature range may be about 60 °C to about 75 °C.

[0010] Thus, as is set forth herein, in some embodiments, a useful thermostable Cas protein is a Cas12 or Cas13 homolog (e.g., ortholog), *e.g.*, a Cas enzyme comprising an amino acid sequence having 80%, 85%, 90%, 99% or 100% sequence identity to any one of SEQ ID Nos. 1-283 that is thermostable at temperatures above about 50 °C, and in some embodiments above about 60 °C, for example within and/or above about 60-65 °C. Those skilled in the art, reading the present disclosure will particularly appreciate that, in some embodiments, a useful thermostable Cas protein is a Cas12 (*e.g.*, SEQ ID NO 3-21, 33-47, 51-56, 68-178, and 274-283, or a variant thereof, for example having at least 90%, 95%, 99% or greater amino acid sequence identity thereto) or Cas13 (*e.g.*, SEQ ID NO 1-2, 22-32, 48-50, 57-67, 179-273, or a variant thereof, for example having at least 90%, 95%, 99% or greater amino acid sequence identity thereto) whose activity (*e.g.*, whose target binding and collateral cleavage activities) is sufficiently thermostable, for example at temperatures within a range of 60-65 °C to perform in assays as described herein (*e.g.*, in some embodiments, one-pot assays). For example, in some embodiments, sufficient thermostable activity is activity that is reasonably comparable to (*e.g.*, within about 25%) of an appropriate reference thermostable Cas protein (*e.g.*, SEQ ID NO 15) as described herein.

[0011] In some embodiments, the disclosure describes a detection method comprising steps of: contacting a CRISPR-Cas complex comprising: a Cas protein with collateral cleavage activity that is thermostable at temperatures above at least 60-65 °C; and a guide RNA selected or engineered to be complementary to a target sequence; with a sample potentially comprising a nucleic acid of the target sequence.

[0012] In some embodiments, the step of contacting comprises contacting the CRISPR-Cas complex and sample with a reporter susceptible to cleavage by the Cas

protein collateral activity. In some embodiments, the step of contacting comprises incubating for a period of time above the temperature. In some embodiments, a detection method further comprises a step of amplifying nucleic acid present in the sample. In some embodiments, the step of amplifying utilizes a thermostable nucleic acid polymerase. In some embodiments, the steps of amplifying and contacting are performed in a single vessel.

[0013] In some embodiments, the Cas protein is a Cas12 protein. In some embodiments, the Cas protein has an amino acid sequence that is at least 80% identical to that of SEQ ID NO: 15. In some embodiments, the Cas protein has an amino acid sequence having at least 80%, sequence identity to any one of SEQ ID Nos. 3-21, 33-47, 51-56, 68-178, and 274-283. In some embodiments, the Cas protein has an amino acid sequence having 80%, sequence identity to any one of SEQ ID Nos. 1-283.

[0014] In some embodiments, in a method of performing a detection assay utilizing a Cas protein with collateral cleavage activity, the improvement that comprises utilizing a Cas protein with thermostable collateral cleavage activity. In some embodiments, the Cas protein is a Cas12 protein. In some embodiments, the Cas protein has an amino acid sequence that is at least 80% identical to that of SEQ ID NO: 15. In some embodiments, the Cas protein has an amino acid sequence having at least 80%, sequence identity to any one of SEQ ID Nos. 3-21, 33-47, 51-56, 68-178, and 274-283. In some embodiments, a method of performing a detection assay is conducted in a single reaction vessel. In some embodiments, the thermostable collateral cleavage activity is thermostable above a temperature of about 60°C. In some embodiments, the thermostable collateral cleavage activity is thermostable above a temperature of about 65°C. In some embodiments, the Cas protein has an amino acid sequence having at least 80% sequence identity to any one of SEQ ID Nos. 1-283.

Brief Description of the Drawing

[0015] Figures 1A and 1B document the insight, provided by the present disclosure that certain Cas13 protein(s) are insufficiently stable at relevant

temperature(s), e.g., at temperatures at which nucleic acid extension and/or amplification reactions are typically performed (e.g., above about 60-65 °C).

[0016] Figure 2 documents the insight, provided by the present disclosure that certain Cas12 protein(s) are insufficiently stable at relevant temperature(s), e.g., at temperatures at which nucleic acid extension and/or amplification reactions are typically performed (e.g., above about 60-65 °C).

[0017] Figures 3A -3C confirms and further demonstrate the thermostability of TccCas13 collateral activity.

[0018] Figure 4 displays an exemplary method for discovery and screening of thermostable Cas enzyme candidates (e.g., Cas12 and Cas 13 enzymes)

[0019] Figure 5 displays an exemplary assessment of Cas12a candidate enzymes by endpoint assay.

[0020] Figure 6 displays an exemplary assessment of Cas12a candidate enzymes by kinetic assay.

[0021] Figure 7 displays an exemplary assessment of candidate enzymes at 58°C by endpoint and kinetic assays.

[0022] Figure 8 displays an exemplary assessment of candidate enzymes at 60°C by endpoint and kinetic assays.

[0023] Figure 9 displays an exemplary assessment of candidate enzymes at 62°C by endpoint and kinetic assays.

[0024] Figure 10 displays exemplary assessment of four candidate enzymes that were purified and activity was measured at varying temperatures (e.g., approximately 35°C to approximately 65°C).

[0025] Figure 11 shows exemplary characterization of a subset of enzyme candidates using three different guide and target sets compared to no template control at both 58°C and 70°C.

[0026] Figure 12 shows exemplary characterization of a Cas12 candidate enzyme with multiple guide/target pairs at both 52°C and 58°C.

[0027] Figure 13 demonstrates kinetic assays for a Cas12a candidate enzyme, RS62, which shows activity at 52°C.

[0028] Figure 14 displays characterization of Cas13 candidate enzymes by endpoint assay at both 37°C and 52°C.

[0029] Figure 15 displays exemplary thermostable Cas12a enzyme, RS9, requires Thermostable Inorganic Pyrophosphatase (TIPP) for amplification. Real time detection of ORF1ab amplification was completed over a range of starting concentrations of ORF1ab (4.5 copies/μL to 4,500 copies/μL in the presence or absence of TIPP).

[0030] Figure 16 demonstrates exemplary thermostable Cas12a enzyme, RS9, is specific for its target and requires TIPP for amplification. Amplification was conducted with a starting concentration of 4,500 copies/μL ORF1ab template and either primers and guides specific to ORF1ab or non-targeting primers with an ORF1ab guide. Each reaction condition was also conducted in the presence or absence of TIPP.

[0031] Figure 17 demonstrates exemplary thermostable Cas12a enzyme, RS9, displays collateral cleavage activity.

[0032] Figure 18 demonstrates RS9 collateral cleavage activity compared to known Cas12a, LbaCas12a.

[0033] Figure 19 demonstrates characterization of exemplary thermostable Cas13a enzyme, TccCas13a. Optimal temperature for TccCas13a activity was determined using a Cas reaction over a range of temperatures. Temperature profiles suggest TccCas13a shows highest activity at approximately 62°C.

[0034] Figure 20 demonstrates TccCas13a can be activated by RNA, but cannot be activated by ssDNA, even at the highest concentrations of ssDNA.

[0035] Figure 21 displays TccCas13a activation requires a higher concentration of ssDNA than RNA, similar to that observed for LwaCas13 ssDNA activation. TccCas13a

was not activated by ssDNA* at any concentration (10 nM, 100 nM, or 1,000 nM) compared to control.

[0036] Figure 22 demonstrates that TccCas13a shows increased collateral activity at “NN” sites compared to “UU” sites, while LwaCas13a shows no preference for collateral activity of “NN” sites compared to “UU” sites.

[0037] Figure 23 demonstrates exemplary characterization of candidate thermostable Cas enzymes, Pal1, Pal2 low MW, Pal2 high MW, and Pal3.

[0038] Figure 24 demonstrates exemplary Pal1 and Pal2 activity at 56°C.

[0039] Figure 25 demonstrates exemplary activity of Pal1 at 37°C, 56°C, and 70°C with different exemplary guides.

[0040] Figure 26 demonstrates exemplary activity of Pal1 at 56°C and 70°C compared to control. These data suggest activity of Pal1 is specific to target DNA.

[0041] Figure 27 demonstrates exemplary temperature profile of Pal1.

[0042] Figure 28 demonstrates exemplary activity of Pal2 high MW at 37°C, 56°C, and 70°C with different exemplary guides.

[0043] Figure 29 demonstrates exemplary activity of Pal2 high MW at 56°C compared to control. These data suggest activity of Pal2 high MW is specific to target DNA.

[0044] Figure 30 demonstrates exemplary temperature profile of Pal2 high MW.

Detailed Description of Certain Embodiments

Collateral Activity Assays

[0045] Those skilled in the art are well aware of the burgeoning plethora of useful detection (e.g., diagnostic) assays that have been and are being developed using Cas

protein collateral activities. *See*, for example, Sashital *Genome Med* 2018:10, 32. Furthermore, those skilled in the art are well aware that a “detailed classification of CRISPR/Cas biosensing systems” based on Cas protein collateral activity has recently been made publicly available. *See* review by Li et al *Trends Biotechnol.* 37:730, July 2019.

[0046] Formats of particular interest include Cas13-based (e.g., Cas13a- or Cas13b- based) systems, including those referenced as “SHERLOCK” and/or “HUDSON” systems (see, for example, Gootenberg *et al*, *Science* 356:438, 2017; Gootenberg *et al*, *Science* 360:339, 2018; Myhrvold *et al*, *Science* 360:444, 2018; see also US10266887) and Cas12- based (e.g., Cas12a- or Cas12b-based) systems, including those references as “HOLMES” or “DETECTR” systems (see, for example, Cheng *et al*. CN patent filing CN107488710A; PCT/CN18/82769 and US 16/631,157; Li et al. *Cell Disc.* 4:20, 2018; Chen et al. *Science* 360:436, 2018; Li, L. et al. bioRxiv Published online July 26, 2018. [http://dx. doi.org/10.1101/362889](http://dx.doi.org/10.1101/362889); US10253365). Both Cas13a and Cas13b enzymes have been used in SHERLOCK and/or HUDSON systems; similarly both Cas12a and Cas12b.

[0047] As is known in the art, and described in references cited herein, typical detection assays that utilize Cas protein collateral cleavage activity involve contacting an appropriate CRISPR-Cas complex, including a Cas protein with collateral activity and a guide RNA complementary to a target sequence of interest, with a sample that may contain the target sequence. Upon recognition of the target sequence, the Cas protein’s collateral activity is activated, so that it cleaves unrelated nucleic acid (DNA or RNA or both, depending on the enzyme). A reporter of the relevant cleavable nucleic acid is provided, appropriately configured (e.g., labeled) so that its cleavage as a result of the activated collateral activity is detectable (e.g., separates a fluorophore from a quencher so that fluorescence becomes detectable, etc).

[0048] In many assays, a target sequence is generated and/or amplified (e.g., copied from RNA to DNA and/or amplified, for example by primer extension, DNA replication (e.g., by polymerase chain reaction) and/or transcription). *See*, for example, Figures 3 and 4 of the above-mentioned Li Review (Li et al *Trends Biotechnol.* 37:730, July 2019).

[0049] Thus, in many embodiments, a collateral activity assay includes steps of (1) target copying and/or amplification; (2) target binding; and (3) signal release and/or detection.

[0050] Typically, collateral activity assays as described herein are *in vitro* assays. In some embodiments, they may be cell free assays (e.g., may be substantially free of intact cells, or, in some embodiments, of cell fragments).

[0051] In some embodiments, collateral activity assays as described herein are performed on samples that are or are prepared from biological (e.g., blood, saliva, tears, urine, etc) or environmental (e.g., soil, water, etc) primary samples.

Thermostable Cas Enzymes

[0052] As described herein, the present disclosure identifies the source of a problem with certain detection (e.g., diagnostic assays) that utilize Cas protein collateral activity, as described above, in that certain Cas proteins with collateral activity are insufficiently stable at relevant temperatures (e.g., at temperatures at which nucleic acid extension and/or amplification are performed). Additionally, The present disclosure further surprisingly demonstrates that, for some proteins, loss of activity upon temperature elevation may be irreversible. This reality increases the significance of the insight, provided by the present disclosure, that Cas proteins with thermostable

collateral activity are particularly desirable for use in assays as described herein. Figures 1 and 2 document these findings.

[0053] The present disclosure therefore provides improved detection (e.g., diagnostic) assays that utilize Cas protein collateral activity, which improved assays utilize a thermostable Cas protein (e.g., whose collateral activity is thermostable) as described herein.

[0054] In some embodiments, steps of nucleic acid detection and target binding are performed in a single vessel; in some embodiments, steps of target binding and signal release are performed in a single vessel; in some embodiments, steps of (1) target copying and/or amplification; (2) target binding; and (3) signal release and/or detection are performed in a single vessel; in some embodiments all steps are performed in a single vessel – i.e., provided improved assays are one-pot assays.

[0055] In some embodiments, improved collateral activity assays as described herein are *in vitro* assays. In some embodiments, they may be cell free assays (e.g., may be substantially free of intact cells, or, in some embodiments, of cell fragments).

[0056] In some embodiments, improved collateral activity assays as described herein are performed on samples that are or are prepared from biological (e.g., blood, saliva, tears, urine, etc) or environmental (e.g., soil, water, etc) primary sample.

[0057] In some embodiments, a Cas enzyme with thermostable collateral cleavage activity is a homolog (e.g., ortholog) of a Cas enzyme that either does not have demonstrable collateral cleavage activity, or has demonstrable collateral cleavage activity but loses such activity above a relevant temperature as described herein.

[0058] In some embodiments, a Cas enzyme with thermostable collateral cleavage activity as described herein is a Cas12 (e.g., Cas12a or Cas12b) enzyme. In some embodiments, a Cas enzyme with thermostable collateral cleavage activity as described herein is a Cas13 (e.g., Cas13a or Cas13b) enzyme.

[0059] In some embodiments, a Cas enzyme with thermostable collateral cleavage activity as described herein is a Cas enzyme comprising an amino acid sequence having 80%, 85%, 90%, 99% or 100% sequence identity to any one of SEQ ID Nos. 1-283. In some embodiments, improved collateral activity assays as described herein are performed using a Cas enzyme comprising an amino acid sequence having 80%, 85%, 90%, 99% or 100% sequence identity to any one of SEQ ID Nos. 1-283.

Target Nucleic Acid

[0060] Those skilled in the art will immediately appreciate that technologies provided herein are broadly applicable to achieve detection of a wide range of nucleic acids including, for example, nucleic acids from an infectious agent (e.g., a virus, microbe, parasite, etc), nucleic acids indicative of a particular physiological state or condition (e.g., presence or state of a disease, disorder or condition such as, for example, cancer or an inflammatory or metabolic disease, disorder or condition, etc), prenatal nucleic acids, etc.

[0061] In some embodiments, a target nucleic acid is detected by an assay comprising a Cas enzyme as described herein and a crRNA. In some embodiments, the structure of the crRNA can affect the activity of the Cas/crRNA complex. In some embodiments the structure of the Cas/crRNA complex contributes to the thermostability of the Cas collateral activity.

[0062] Typically, provided technologies will be applied to one or more samples to assess presence and/or level of one or more target nucleic acids in the sample. In some

embodiments, the sample is a biological sample; in some embodiments, a sample is an environmental sample. In some embodiments, a sample is a crude sample (e.g., a primary sample or a sample that has undergone minimal processing).

[0063] In some embodiments, a sample will be processed (e.g., nucleic acids will be partially or substantially isolated or purified out of a primary sample); in some embodiments, only minimal processing will have been performed (i.e., the sample will be a crude sample).

Exemplification

Example 1: Temperature profile for LwaCas13a

[0064] The thermostability of LwaCas13a was tested. Briefly, labeled RNA target was incubated with Rnase Inhibitor; T7 RNA Polymerase, LwaCas13a, MgCl₂ and a cRNA. Individual samples were incubated at various temperatures to determine collateral activity.

[0065] Figure 1A presents a temperature profile for LwaCas13a collateral activity. As can be seen, low activity was observed above 45 °C; activity was completely abolished about 55 °C.

[0066] Further, figure 1B presents results of testing the reversibility of loss of LwaCas13a at higher temperatures. LwaCas13a was incubated for 5 minutes at 65 °C (“heat pulse”) while the control group (“no heat pulse”) was incubated at room temperature. The active of both enzymes was then tested at 37 °C. The heat pulse group shows no activity. This reality increases the significance of the insight, provided by the present disclosure, that Cas proteins with thermostable collateral activity are particularly desirable for use in assays as described herein.

Example 2: Temperature profile for AsCas12a and Lbacas12a

[0067] The thermostability of AsCas12a and Lbacas12a was tested. Briefly, labeled RNA target was incubated with Rnase Inhibitor; T7 RNA Polymerase, AsCas12a or Lbacas12a, MgCl₂ and a cRNA. Individual samples were incubated at various temperatures to determine collateral activity.

[0068] Figure 2 presents temperature profiles for AsCas12a and LbaCas12a. As can be seen, low AsCas12a activity is observed at temperatures greater than 55 °C. AsCas12a remains active at 60°C for ~5min. AsCas12a has <10% activity at 65°C for a few minutes. Further, LbaCas12a activity is significantly diminished at temperatures greater than 55 °C.

Example 3: Exemplary thermostable Cas candidates

[0069] The present Example describes certain thermostable Cas13 candidates for use in improved collateral activity assays as described herein.

[0070] In the present Example, it was determined that a Cas13 with collateral activity thermostable within a temperature range of about 62- about 68°C would be particularly desirable, among other things, in one-pot assays with LAMP pre-amplification.

[0071] We performed a computational search for potentially thermostable Cas candidates and identified:

- 2 Cas13a candidates:

TccCas13a (*Thermoclostridium caenicola*)

[0072] Exemplary sequences for use with TccCas13a include, but are not limited to:

Agtgtctttgcaggaaagaacacagatcttgagggtcacactccatgtaggcggagactgcaacccctatagtgagtcgtattaatt tc (SEQ ID NO.:284) (forward DR crRNAs); and
agtggtctttgcaggaaagaacacagatcttgagggttcagtcctcgctacatgggagttgtgaccctatagtgagtcgtattaat ttc (SEQ ID NO.:285) (reverse complement DR crRNAs);

ThpCas13a (*Thalassospira profundimaris*)

[0073] Exemplary sequences for use with ThpCas13a include, but are not limited to:

Tctttgcaggaaagaacacagatcttgagggtgtagttcccctcaatttggggatgaacgtcgaccctatagtgagtcgtattaat ttc (SEQ ID NO.:286) (forward DR crRNAs); and
tctttgcaggaaagaacacagatcttgagggtcgacgttcaccccaattgagggaactacacccctatagtgagtcgtattaat tttc (SEQ ID NO.:287) (reverse complement DR crRNAs);

- 4 Cas12b candidates:

- AacCas12b (*Alicyclobacillus acidoterrestris*)
- AkCas12b (*Alicyclobacillus kakegawensis*)
- BhCas12b (*Bacillus hisashii*)
- LsCas12b (*Laceyella sediminis*)

[0074] Exemplary sequences for use with AacCas12b include, but are not limited to:

ttgtgagcggataaacacaggtgccacttctcagatttgagaagctcaacgggctttgccacctggaaagtgccattggca
caccg gttgaaaaattctgtcctctagaccctatagtgagtcgtattaatttc (SEQ ID NO.:288) (crRNA)

[0075] Exemplary sequences for use with AkCas12b include, but are not limited to:

Ttccggctcgtatgttggtggaattgtgagcggagtgccacttctcagaccgctcgccctatagtgagtcgtattaatttc
(SEQ ID NO.:289) (crRNA); and

cgagcggatcatctgaagccaacggggtgttgctcttggaagagcacattggcacttcccgttgctcctgcgcgtcctatag
acgac ccctatagtgagtcgtattaatttc (SEQ ID NO.:290) (tracrRNA)

[0076] Exemplary sequences for use with BhCas12b include, but are not limited to:

aattgtgagcggataaacacaggtgctaatagcctcccctatagtgagtcgtattaatttc (SEQ ID NO.:291)
(crRNA); and

gagacatcgtccagcaataggagttttcacaccctgcagcacttatagctagacggtgtcctgacaaaaagacagaacc
cctata gtgagtcgtattaatttc (SEQ ID NO.:292) (tracrRNA)

[0077] Exemplary sequences for use with LsCas12b include, but are not limited to:

Atgggtcatagctgtttcctgtgtttatccgctcagtgctaataacattatcatctaccctatagtgagtcgtattaatttc
(SEQ ID NO.:293) (crRNA); and

Gataaataatgtaatcctgtggttgatggatttttccatccttagcacacgcacagtattctttgcccttaggcaaacct
atagtg agtcgtattaatttc (SEQ ID NO.:294) (tracrRNA).

[0078] Exemplary sequences of Cas proteins with thermostable collateral activity include those described in Table 1:

Table 1: Exemplary sequences of Cas proteins with thermostable collateral activity

SEQ ID NO.	Cas Enzyme	Putative Sequence
1	TccCas13a (<i>Thermoclostridium caenicola</i>)	MKITKRKWGEHHPPLYFYRDEDSGRLLAQNDRKQDYTD TLFNDIAQDTFERSLRNRLKTPEKGDKRFYSNEIVKLVE KLCQGADVAEIMKSMERNEKLRPKNEKEIKNLKKQLDG TLSEYGKRYTAPEGAMTLNDALFYLVGNPLKQAMAK AELGKIREALIKEKENRINRVYSIKNNKIPLRIQEDGGIT PNNDRAAWLLGLMKPADPAKGITDCYPLLGELEEVD DKLSKTLHEKISRCQGRPRSIAMAVDEALKQYLRELWEK SPSRQQDLKYYFQAVQEYFKDNFPIRTKRMGARLRQELL KDKTSLSRLLPEKHMNAVRRRLINQSTQMHIYGLY

		AYCCGEDGRLLVNSETLQRIQVHEAVKKQAMTAVLWSI SRLRYFYQFEDGDILSNKNPIKDFRDKFLRDTNKYTHED VEACKEKLQDFFPLKELQEIKEDAKGLQETDNKQADTT DFKAIGHIVRDDRKLCLNQLLAECVSCIGELRHHIFHYKN VTLIQALKRIADKVKPEDLSVLRAIYLLDRRLNKKAFK RISSMNLPLYREDLLSRIFKKEGTAFFLYSAKIQMTPSFQ RVYERGKNLRREFECERMKAEASNGQNGQDGRDLKWF RQLAAGDSADTHFNWAVEAYAESAADVENNVFDTDV DAQRALRNLLLLIYRHHFLPEVQKDETLVTGKIHKVLER NRQSEGQGNQGAHGYSVIEELYHEGMPLSDLMKQL QRRISETERESRELAQEKTDYAQRFILDFAEAFNDFLEA HYGEEYLEIMSPRKDAEAAKKWVKESKTVDLKTSIDEK EPEGHLLVLYPVLRLDERELGELQQMIRYRTSLASWQ GESNFSEEIRIAGQIEELTELVKLTEPEPQFAEEVWGKRA KEAFEDFIEGNMKNYEAFYLQSDNNTPVYRRNMSRLLR SGLMGVYQKVLASHKQALKRDYLLWSEKHWNVKDEN GADISSAEQAQCLLQRLHRKYAESPSRFTTEEDCKLYEKV LRRLEDYNQAVKNLSFSSLYEICVLNLEILSRWVGfVQD WERDMYFLLLAWVRQGLDGIKEEDVRDIFSEGNIRNL VDTLKGEMNNAFESVYFPENKGSKYLGVRNDVAHLDL MRKNGWRLEAGKTC SVMEDYINRLRFLLSYDQKRMNA VTKTLQQIFDRHKVKIRFTVEKGGMLKIEDVTADKIVHL KGSRLSGIEIPSHGERFIDTLKALMVYPRG*
2	ThpCas13a (<i>Thalassospira profundimaris</i>)	MRIIKPYGRSHVEGVATEQPRRKLRLNTRPDISRDPGFA QSHDALIAQWISAIKIDKATPKPKDQKPTQRQMNLRTTLG DAAWQHLMANLLPAKDPAREKLHLIWQSKIAPWGA SRPQEEKRGKPTPKGGWYERFCGALSPEAITKPNVARQIA KDIYDHLVVAARKRGREPVKQGESSNKPQKFKPDRKLS LIEERAESIAKNALRPGTHAPCPWGQDDQAIYEQAGDVA TKIYDDARDYLEDKKRRSGNRNTSSVQYLPRDLAVKILY AQYGRVFGPDTTIKAALDEQQSLFALHTAIKDCYHRLVN DARKRHILRILPRNMAALFRLVRAQYDNRDINALIRLGK VIHYHAGEQGKDEHHGIRDYWPSQQDIQNSRFWGSQDQ ADIKRHEAFSRIWRHIALASRTLHDWADPDSQKFTGDD DDILMRAGAIESNVWDAGRYERKCDVLFQAQASLFCGA EDFEKATLKQAITGTGNLRNATFHFKGKARFENELQRLA DDVPVDVQSAIAALWQKDAEGRTRQIAETLQAVLAGHF LSERQNRHILATLMAAMAQPGDVPLPRLRRVLARHDSIC QRGRILPLPPCPDRAKLEESPALTCQYTVLKMMLYDGPFR AWLAQQNSTILNHYIDSTIARTNKAQDMNGRKLAPAE KDLITARAADIPRLSVDEKMVDLGRRLTAATATEMRVQ RGYQSDGEKAQKQAGYIGEFECDVIAFAFSDFLGQSGFD FVLKCLKADTPKPDAAQCDVAALIAPGDVPALTPQAWQQ VLYFILHLVPVDDASRLHQRKWKQALEKKGKDKKEVKK EKDKKEVKKDEKPDIALDLSVLMLYLDMDHDAKFTGGA

		ALHGIEKFAEFFVEKADFRAVFPPQSLQDQDRSIPRRGLR EIVRFGHLP LLQHMSGTVKITHDNVVAWQTARTPDATG TSPIARRQKQREELHALAVERPARFRNADLHNYMHALV DVIKHRQLSAQVTLSDQVRLHRLMMGVLGRLVDYAGL WERDLYFVLLALLYHHGVTDPDDVLKGQGRKRLADGQV VEALKPKNRKAAAPVGVFDDLDHYGIYQDDRQSIRNGL SHFNMLRGGTAPDL SHWVNQTRRLVAHDRKLNNAVAK SVIEMLAREGFDDLDWTIEPDSGKHILRHGKIRTRQAQHFQ KSRIRIEKKSAPDKNDTVKIRENLHGDAMVERVARLFA ARAQKYRDIITTEKRLDHLFLKPKG*
3	AacCas12b (Alicyclobacillus acidoterrestris)	MAVKSIVKLRLLDDMPEIRAGLWKLHKEVNAGVRYYT EWLSLLRQENLYRRSPNGDGEQECDKTAECEKAELLERL RARQVENGHRGPAGSDDELLQLARQLYELLVPQAIGAK GDAQQIARKFLSPLADKDAVGGLGIAKAGNKPRWVRM REAGEPGWEEKEKAETRKSADRTADVLRALADFGLKP LMRVYTDSEMSSVEWKPLRKGQAVRTWDRDMFQQAIE RMMSWESWNQRVGQYAKLVEQKNRFEQKNFVGQEH LVHLVNQLQQDMKEASPGLESKEQTAHYVTGRALRGSD KVFEKWGKLAPDAPFDLYDAEIKNVQRRNTRRFGSHDL FAKLAEPEYQALWREDASFLTRYAVYNSILRKLNHAKM FATFTLPDATAHPIWTRFDKLGGNLHQYTFLENEFGERR HAIRFHKLLKVENGVAREVDDVTVPISMSEQLDNLLPRD PNEPIALYFRDYGAEQHFTGEFGGAKIQCRDQLAHMHR RRGARDVYLVNSVRVQSQSEARGERRPPYAAVFRLVGD NHRAFVHFDKLSDYLAHPDDGKLGSEGLLSGLRVMSV DLGLRTSASISVFRVARKDELKPNKGRVPFFPIKGNND LVAVHERSQLLKLPGETESKDLRAIREERQRTLRLRTQ LAYLRLLVRCGSEDVGRRERSWAKLIEQPVDAAANHMT DWREAFENELQKLKSLHGICSDKEWMDAVYESVRRVW RHMKGQVRDWRKDVRSGERPKIRGYAKDVVGGNSIEQI EYLERQYKFLKSWSFSGKVSQGVIRAEKGSRAITLREHI DHAKEDRLKKLADRIIMEALGYVYALDERGKGKWWAK YPPCQLILLEELSEYQFNNDRPPSENNQLMQWVSHRGVFQ ELINQAQVHDLVGTMYAAFSSRFDARTGAPGIRCRVP ARCTQEHNPFPFWLNFVVEHTLDACPLRADDLIPTG EGEIFVSPFSAEEGDFHQIHADLNAAQNLQQRLWSDFDIS QIRLRCDWGEVDGELVLIPRLTGKRTADSYSNKVFTNT GVTYYYERERGGKRRKVF AQEKLSEEEAELLVEADEARE KSVVLMRDPGSIINRGWTRQKEFWSMVNQRIEGLVK QIRSRVPLQDSACENTGDI
4	AkCas12b (Alicyclobacillus kakegawensis)	MAVKSIVKLRLLSECPDILAGMWQLHRATNAGVRYYTE WVSLMRQEILYSRGPDGGQCYMTAEDCQRELLRRLRN RQLHNGRQDQPGTDADLLAISRLYEILVLQSIGKRGDA QQIASSFLSPLVDPNSKGGRGEAKSGRKPAPQKMRDQG

		DPRWVAAREKYEQRKAVDPSKEILNSLDALGLRPLFAVF TETYRSGVDWKPLGKSQGVRTWDRDMFQQALERLMSW ESWNRVRGEEYARLFQQKMKFEQEHFAEQSHLVKLARA LEADMRAASQGFQAKRGTAHQITRRALRGADRVFEIWK SIPEEALFSQYDEVIRQVQAEKRRDFGSHDLFAKLAEPKY QPLWRADETFLTRYALYNGVLRDLEKARQFATFTLPDA CVNPIWTRFESSQGSNLHKYEFLFDHLGPGRHAVRFQRL LVVESEGAKERDSVVVPVAPSGQLDKLVLREEEKSSVAL HLHDTARPDGFMAEWAGAKLQYERSTLARKARRDKQG MRSWRRQPSMLMSAAQMLEDQAGDVYLNISVRVKS PSEVRGQRRPPYAALFRIDDKQRRVTVNYNKLSAYLEEH PDKQIPGAPGLLSGLRVMSVDLGLRTSASISVFRVAKKEE VEALGDGRPPHYPIHGTDDLVAVHERSHLIQMPGETET KQLRKLREERQAVLRPLFAQLALLRLLVRCGAADERIRT RSWQRLTKQGREFTKRLTPSWREALELELTRLEAYCGR VPDDEWSRIVDRTVIALWRRMGKQVRDWRKQVKSGAK VKVKGYYQLDVVGGNSLAQIDYLEQQYKFLRRWSFFARA SGLVVRADRESHFAVALRQHIEENAKRDRLKKLADRILM EALGYVYEASGPREGQWTAQHPPCQLIILEELSAYRFS DRPPSENSKLMWGHGILEELVNQAQVHVDLVGTVYA AFSSRFDARTGAPGVRCRRVPARFVGATVDDSLPLWLTE FLDKHRLDKNLLRPDDVIPTGEGEFLVSPCGEEAARVRQ VHADINAAQNLRRLWQNFIDITELRLRCDVKMGEGTV LVPRVNNARAKQLFGKKVLVSQDGVTFERSQTGGKPH SEKQTDLTDKELELIAEADEARAKSVVLFDRPSGHIGKG HWIRQREFWSLVKQRIESHTAERIRVRGVGSSLD
5	BhCas12b (Bacillus hisashii)	MATRSFILKIEPNEEVKKGLWKTHEVLNHGIAYYMNILK LIRQEAIYEHHEQDPKNPKKVSKAEIQAEWDFVLKMQK CNSFTHEVDKDEVFNILRELYEELVPSSVEKKGEANQLS NKFLYPLVDPNSQSGKGTASSGRKPRWYNLKIAGDP SW EEEEKKWEEDKKKDPLAKILGKLAEYGLIPLFIPYTD SNE PIVKEIKWMEKSRNQSVRRLDKDMFIQALERFLSWESW NLKVKEEYKVEKEYKTLERIKEDIQALKALEQYKER QEQLLRDTLNTNEYRLSKRGLRGWREIIQKWLKMDENE PSEKYLEVFKDYQRKHPREAGDYSVYEFLSKKENHFIWR NHPEYPYLYATFCEIDKKKKDAKQATFTLADPINHPLW VRFEERSGSNLNKYRILTEQLHTEKLKKKLTVQLDRLIYP TESGGWEEKGKVDIVLLPSRQFYNQIFLDIEEKGKHAFTY KDESIKFLKGTGGLGARVQFDRDHLRRYPHKVESGNVG RIYFNMTVNIEPTESPVSKSLKIHRRDDFPKVVNFKPKELT EWIKDSKGGKLLKSGIESLEIGLRVMSIDLQORQAAAASIF EVVDQKPDIEGKLFFPIKGTELYAVHRASFNIKLPGETLV KSREVLRLKAREDNLKLMLNQLNFLNRNVLFHQFEDITER EKRVTKWISRQENS DVPLVYQDELIQIRELMYKPYKDW VAFLKQLHKRLEVEIGKEVKHWRKSLSDGRKGLYGISLK

		NIDEIDRTRKFLLRWSLRPTEPGEVRRLEPGQRFADQLN HLNALKEDRLKKMANTIIMHALGYCYDVRKKKWQAKN PACQIILFEDLSNYPYEERSRFENSKLMKWSRREIPRQV ALQGEIYGLQVGEVGAQFSSRFHAKTGSPGIRCSVVTKE KLQDNRRFFKNLQREGRLTLDKIAVLKEGDLYPDKGGEK FISLSKDRKCVTTHADINAAQNQLQKRFWTRTHGFYKVY CKAYQVDGQTVYIPESKDQKQKIEEFGEQYFILKDGVS EWNAGKLLKIKKGSSKQSSSELVSDILKDSFDLASELK GEKLMLYRDPSPGNVFPDVKWMAAGVFFGKLERILISKLT NQYSISTIEDSSKQSM
6	LsCas12b (Laceyella sediminis)	MSIRSFKLKIKTKSGVNAEELRRGLWRTHQLINDGIAYY MNWLVLRRQEDLFIRNEETNEIEKRSKEEIQGELLERVHK QQQRNQWSGEVDDQTLQLTLRHL YEEIVPSVIGKSGNAS LKARFFLGPLVDPNNKTTKDVSKSGPTPKWKKMKDAGD PNWVQEYKEYMAERQTLVRLEEMGLIPLFPMYTDEVDG IHWLPQASGYTRTWDRDMFQQAIERLLSWESWNRVRRE RRAQFEKKTHDFASRFSESDVQWMNKLREYEAQQEKS EENAFAPNEPYALTKKALRGWERVYHWSMRLDSAASEE AYWQEVATCQTAMRGEFGDPAIYQFLAKENHDIWRG YPERVIDFAELNHLQRELRRAKEDATFTLPDSVDHPLWV RYEAPGGTNIHGYDLVQDTKRNLTLILDKFILPDENGSW HEVKKVPFSLAKSKQFHRQVWLQEEQKQKKREVVFYD YSTNLPHLGTLAGAKLQWDRNFLNKRRTQQQIEETGEIGK VFFNISVDVRPAVEVKNGRLQNLGLGKALTVLTHPDGTKI VTGWKAEQLEKWWGESGRVSSLGLDSLSEGLRVMSIDL GQRTSATVSVFEITKEAPDNPYKFFYQLEGTELF AVHQRS FLLALPGENPPQKIKQMREIRWKERNRIKQQVDQLSAILR LHKKVNEDERIQAIKLLQKVASWQLNEEIATAWNQAL SQLYSKAKENDLQWNQAIKNAHHQLEPVVGKQISLWRK DLSTGRQGIAGLSLWSIEELEATKKLLTRWSKRSREPGV VKRIERFETFAKQIQHHINQVKENRLKQLANLIVMTALG YKYDQEQKKWIEVYPACQVVLFFENLRSYRFSYERSRRE NKKLMEWSHR SIPKL VQM QGELFGLQVADVYAAYSSR YHGRTGAPGIRCHALTEADLRNETNIIHELIEAGFIKEEHR PYLQQGDLVPWSSGELFATLQKPYDNPRILTLHADINAA QNIQKRFWHPSMWFRVNCESVMEGEIVTYVPKNKT VHK KQGKTFRFVKVEGSDVYEWAKWSKNRNKNTFSSITERK PPSSMILFRDPSGTFEKEQEWVEQKTFWGVQSMIAYM KKTIVQRMEE
7	Cas12	MFKKKLFDDDEFISLAQNQEESNALNAFKGFTTHFKDFQENRKNMYS EDKESTAIAYRIIHENLPVITNNIRFEKIINELDRSNIHSIEKELKEELANN KLKIDIFNIEYFQNTLTQNDITRYNTIIGGKVKADGKKVQGLNEYINLFN QHNKDKKLPPLKPLYKQILSEENSASFIVPAFEKDNEVLQSIFDFWNKCI IDAKGPISGKKYNLLSKIQSLLQNLDKLNNQLEEMYFENENLSTISNDV

		YQQWNLIRDALGNFYNSIDAKKNKKDYYSWKEIQDALVYYKQTNDEY KDIDQKAFLIYFKEMKVNDGEENTNNNIINLINERYKRIEPLLKEDRDN RKDLHQDKGKVAIIKEFLDSLKLLQNTIKLLYVDDSLDNMNYDFYNQLT DYYETLRPLNTLYNRVRNYMTRKPFSEEFVLTFSPTLLDGWDLNKE EANLGVILRKDNKYLGIMNKGDNKIFKKYDEEPGDDYEEKMVYKLLP GPNRMLRKVFFSNKNIEYYKPNQDIQNLYNKGEFCKGESLNKESLHKLI DFYKNSISKNGDWSVFNFKFKTTAYDDISQFYKDVENQGYKLFFKTIK TSYIDQLVNEGKLYLFQIYNKDFSENKKRKDESNPNLHTIYFKNLFSEDN LKNVVYKLNKGAEVFYRKKSIEYPEEIRRKGGHHYNELKDKFDYPIIKDR YSEDKFLFHVPIITLNLAKSDEKVNEMVKNYIAATNEKIHIGIDRGERN LLYSLIDSNGNIVKQQLNIIELPKYQKQIDYHAKLNEKEKQRLAARQN WDVNIENIKELKEGYLSQVIHQIARLMVDYKAILVMEDLNFGRGRFK VEKQVYQKFEKMLIDKLSYLVFKEKNLCEPGGSLRAYQLSAPFKSFKAL GKQSGMIFYVPAQYTSKIDPTTGFYNFLNIDVSNLARSKETFSKFDKIVY NKKEDYFEFYCKMINFESANQLTKKSQNKANAELKEFQWILCSTHHDR FKVERKNNQINYCKINVNEELKLLNSKGINYEKSNLDKSEILNIDESKFF KELGYLLKILVSLRYNNGKKGSEEQDFILSPVKNASGKFFCTLDNNNTLP LDADANGAYNIALKGLMIVQVRKAGGKLDLSISKDDWINFLIMNKKLP K
8	Cas12	MSNQSVFKDFTNLYELSKTLRFELKPVGKTLRMLLEDAKVFKTDELIQKK YEQTTPFINKLHQEFVKESLEGRSLEGLESYQDILKEWQKDKKDKIAQK NLGIKEKELYKQVTQLFNAKAKEWSEPYAHLGLKKKDIGILFEEGVFKIL KEKYNNDKDAKITNKVTGEIFFEDFWKGFVGYFQKFFETRKNFYKDDG TSTAIATRIVAQNLRFCDNIGLFEKIKDQIDSSEVEQSFGISMEKVFSLD FYNQCLLQGGIDKYNEILGGKTLENGEKFKGINELINKYRQDNKGDKSS FLKILDKQILSEKESFIDEIKNDKELEETLKNLHETAKVKTKIFGTLFEDFIG NNTKYDLAKIYISKEAFNTISHKWTGGTDLFAENLFNALKDEQILKSSAK KKDGSYVFPDFIEFLHIKTALENVPKDINFWKERYVVKENKEFFLG NGEIWQQFLQIFNFEFNELFQKEIIDNQTGKKMHIGYKVYKEEISKLE DFKVDKSTVIIKHFAADSVLWIYQMAKYFALEKKRTWRDEYDLDTFYT DPKNGYLAFYENAYEEIVQIYNKLRNYLTKKPYSTEKWKLNFNQNSTLAS GWDKNKEADNFTVILRKDGKYFLGLMRKGANKLFDKRYGSEFSQGLE KGKYEKMNYKYFPSPSKMIPKTSTQVHEVKKHFKNSSEPFFLEESSLG KFIKQLKITKEVFDLNNFEYKKSYSSTLNGESPDESQRVKADSKKTQV KLFQKEFLNLSQNELLYKKSLFAWVDFCKEYLDCFPSTGDGFLQFKKYI QDTEKYESIDQFYKDIERGGYKISFQNISEYISCKNQNSELYFKIHND WNLKDGPKTGMKNLHTMYFESLFSSENIAQNFPMLNGQAEIFYRP KTDINKLEMKKDSKGNVVDHKRYEEDKIFFHLPMTLNRGKSLFNFNV QLNNFLADNPEINIIGVDRGEKHLAYYSVINQNEILDGGTLNVVKGG NGKDIDYHKKLEDKAEKREQARKDWQDVEGIKDLKKGYISQVVRKLA DLAIEHNAIIVFEDLNMRFKQIRGGIEKSVYQQLEKALIEKLSFLVRKNE KNPEEAGYLLKAYQLSAPFETFQRIGKQTGIIFYTQASYTSKIDPLTGWR

		PNLYLKYSNAKKAKADISKFSEIEFINNRFEFTYDLQEFERSQKDKKKEYP KKTLLWTLCSSVERYRWNRKLNNDNKGGEHYSDLTSDFKKLFKKYNINI NEDILGQIENMDTDDRKNRNARFFSGFMFFWNLICQIRNTNSDVISGE SDNDFILSPVEPFFDSRKASQFGSDLPENGDDNGAFNIARKGIMILKKI SQYVEENENCDKLKWGDLYISHTDWDNFI
9	Cas12	MTNYTDFIGLYPVQKTLRFELRPQGKTAEKMRSEGLLEQDREKAKNYI VMKALIDDYHRRFINELLEKASFDWQPLFEALNNVKVNKDDKSKKELE KEQLHMRKELIGLFEEKDERFKYLFSEKLFSELLNKEISERNPDEMEAM RSFDRFSGYFIGFHENRRNIYSNEDKHNSLAYRVVAENFPKFADNCRK YSLIKENMQEAVVEFKKEIASVVVIDVDQMFDISYFNKVLTKQKIDDY NTMLGGVSEEGSVKIRGLNEFLNLYYQKVTDNKRIMAPLYKQILCESK TKSFIPYMFENDEEVISSINQYYDSVKYDILQRSVYLLSNYKEYDASKIFI DQKSISSISIVLFGSWETLGGMLQIYKADQIGDPGLEKTRKKVDKWLSS SYFTLKEVFEAIGEQQPFRVYVEKLSVLKNIEEFDKSCLEGTHTFSGDEL LTQDIKGFLLDLMQVHLMKPFNAKEDLDKDAAFYSEYNEIYEALSEIIP LYNKVRNYATKKKYSTYKIKMNFNGNPTLAAGWDLNKERDNTAVILLR GNNYYLGIMNPKKKTKEELPSGEDNDCYRKMVYKLLPGPNKMLPKV FFSKKGIGTFNPSKEILEGYETGKHKLGDSDIDYCHSLIDFFKENIPKYG DWGTYEFKFSPTTEYSQFYKEVSEQGYKITFQNISRAIDDLVNNNG ALFLYQIYNKDFSEHSKGKNNLHTMYWKAAFSEENLRNVVIKINGEAE LFYRDKSDISKTEHSAGTILVNRTDRKDNPIPNISYIELFYKGTGQIKSVS DEAKQYLDLVTHEAKYPITKDRRYTEDRMFFHIPITLNFSGSGNTNIN KAVIDHVLNSKDVHIIGIDRGERNLLYVSVIDRKGNIQKQSLNVIDGIDY HEKLDQREKENISARKSWSNVEKIKDLKEGYLSYVIH
10	Cas12	MKDFYQFTNLYALSKTLRFSLIPTPATKQMLEDAKVFEKDETIQKKYEA TKPYFDRLHREFALEALQDQKLDKFNLYELRYKADKKASGKLLINIEK DLRKEVVKLFQKQGEKWAKQYPGLKNKNIGVLFKEAVFTVILKERYGN EKETQILDESSGQLVSIFDSWKGFYGFYFKKFHETRKNFYKDDGTSTALA TRIIDQNLKRFCNLIFFESTKEKVDSEVEISFGKPLSEVFTLEFYNTCFL QNGIDFYTKILGGETLQNGEKVKGLNECINLHKQKTGEKLPFFKSLDKQ ILSEKDKFFIDEISNETQLLEVLKSFVASAESKTDITKTLVDDFVKDQDKY DLNYIYFSNDGLNTITRKWTTETQVFEEALYTALKAAKVSSSAKKNEG GYSFPDFIPFAHLKTALESIKIDGTIWRDNFNAIENFEESIWAQFLAIY NFELSNLFETEIKNPEIGNCPTIGYNVYKQDFEELLKSFVYDPNAKVTIK NFADNVLSIYQMAKYFAVEKKRGWNTDYELDVFYDPQNGYLQYYE NAYEEIVQVYNKLRNYLTKKPYSEEKWKLNFDSGTPIKYTTTRAIIFNNTT NERYYLGLLKKGVAKPREFEPINNNIISSEGEFRMIIQQLKFQTLGAGGY VRDFGVKYSKDKGVKHLQQLIKKQYLSKYPCLKKIADGVYNDKKAFFD ADIKDVLLLETYNLDFQPISEEFILNKNRLGEIYLFIEHNKDWNLKDGKNK SGSKNLHTMYFESLFVDKTTFKLNNEGAEEVYRPAATNEGKLGTKKDRN GKIIINHCRYATDKILFHCPGLNKDAGKSYTFNAKINNMMLANNPDINII

		GVDRGEKHLAYYSVITQKGKILDRGSLNKVEGGDKQEIDYAKKLEETAK NREQARKDWQAVEGIKDLKRGYISQVVRKLADLAIEHNAIIVFEDLNM RFKQIRGGIEKSVYQQLEKALIDKLSFLVMKGEADPEKAGHLLKAYQLV APFESFQSMGKQTGIIFYTQANYTSKIDPITGWRPNLYLKYSAEKAKA DILKFSKIEFVNNRFELTYDIKNFVLDKKVVLNKTWTVCSVERFRW NRRLESNQGNIEHYENLTENLSSLFKDFGFEIEQNIIRQVEQLATKGNE QFFRSFIFYVNLIFQIRNTDAKAKDQNKEDFILSPVEPFDSRTPEKFGE NLPENGDDNGAFNIARKGIIMLNKISAYKQEVGNVDKIWKDLFISAAE WDNFTQE
11	Cas12	MDSYEQFTKLYPIQKTIRFELKPQGRTKEHFDNSNFLEKDRERDDNYKI LKEVIDDYHREFIDECLSNQLNWDDLKFFSEYRRSKEKNNRDESE QKRMSTTSETRAINKKNLEAEQKRMERGEIVSAFKKDDRFKHLFSEKLS ILLKNQIYEKGTLEEIEAFDCFNKFSGYFKSFHENRKNMYSDEDKETAIS YRIINENFPKLLDNFEKYQYVCREYPEQIREAESTLAEAGCYIKMDEIFI DNFNNVMMQGGKESGISRYNLAIGGIVQGTGEKPKGLNEFLNLAYQ NEPNGRKKIRMEPLYKQILSKEESFSYRLEAFTDDSQLLSAIRSFFDIVEK DKNGNIFDRAVNLMSFSNYDTSKIYIRKAYLNQVSKEIFGYRGKSDSK PAKTADESLNKSGGWEKLGQMLRDYKADSIGDRNLEKTCKKVDKWL DSDEFTLSDILGAISLAGSNETFEAYVSEICVARRNIDKEKEKKNINVEK ISGDTESIQIICALDSVQEFFHLLSPFQLHPNTPHDWTFYAEFNDIYDK LSAITPLYNQARNHLTKKNLDTSKIKLNFNNPTLANGWDVNKEYENTA VILIRDGKYLLGIMNPKNRKIKFDEGSGAGPFYQKMVYKLLPGPYRM LPKVFFAKKNIDYYNPSQEIREGYKAGKHKKGKEFDKGFCCHKLIDFFES IQKNENWKVDFKFSPTESYDDISEFYQEVEKQGYRMYFVNIPSDTIDR YVEGGDMFLFIQYNKDFAKGAKGNKDMHTLYWNAVFSEENLQKGV MKLSGEALFYRKKSDIKDPPHREGEILVNRTYIDRTHVSGVMGEQNT VKESRIPVPDEIHKNLFDYYNHGRELTKEEKEYCDKVGSKAYYGVKD RRYLENKMYFHVPLTLNFKAIGEKRINKMAIEKFLTDENACIIGIDRGER NLLYYSIIDRNGKIIDQKSLNVIDGFDYHEKLSQRQTEREVARQSWNSI GKIKDLKEGYLAKAVHEISKMAIKYNAIVVLEDLHFGFKKGRKLVKQJY QKFEEMLINKLNYLVFKDVSDDAGGVLNAYQLTAPLESFSKLGKQS GILFYVPAAFSTVIDPTTGFDVLFNSSSITSTQKKKEFLQRFESIVYSARD GGIFAFTFDYRNFSKIATDHRNMWTVYTHGERIRYVRDEKCYKTDTPT KRIKEALSGIEYDDGSDIRDKITQSGDNNLINTVYHSFMDTIKMRNKD GRIDYIISPVKNRNGEFFRSDYKHRDFPVDADANGAYHIALKGELLMR MIGKTYDSNSDKMPKLEHKDWFEFMQTRGDQ
12	Cas12	MKKEKEFKSFGDFTNLYEISKTLRFELKPVENTQTMLDEADVFGKDKVI KDKYTKTKPFIDKLHREFVDES LKDVSLGLKKYSEVLENWKKNNKKDKD IVKELKKEEERLRKEVVEFFDNTAKKWANKEYKELGLKKDIGILFEESV FDLLKEYGEEQDSFLKEEKGDFLKNEKGEKVSIFDEWKGFVGYFTKFQ ETRKNFYKNDGTETALATRIIDQNLKRFCDNIDDFKKIKNKIDFSEVEKN

		FNKTADVFSLDFYNQCLLQKGIDSYNEFIGGKTLENGKKLKGVNELVN EYRQKNKNEKVSFLKLLDKQILSEKEKLSFGIENDEQLLVVLSNFYETA EKTILRTLFGDFVEHNENYDLDKTYISKVAFNTISHKWTNETHKFEELL YGAMKEDKPIGLNYDKKEDSYKFPDFIALGYLKKCLNNLDCDTKFWKE KYYENNADKKDKDKGFLTGGQNAWDQFLQIFIFEFNQLFNSEAFDNK GKEIKIGYDNFRKDFEEIINQKDFKNDENLKAIAKNFADSVLWYQMAK YFAIEKKRGWDDDFELSEFYTNPSNGYSLFYDRAYEEIVQKYNDLRNYL TKKPYKEDKWKLNFENPTLANGFDKNKESDNSTVILRKKRKYLGMLK KGNNKIFEDRNKAEFIRNIESGAYEKMAYKLPDVAKMIPKCSQTLNE AKNHFRNSADDLEIKKSFSNPLKITKRIFDLNNIQYDKTNVSKKISGDNK GIKIFQKEYYKISGDFDVYKSALNDWIDFCKDFLSKYDSTKDFDFSILRKT KDYKSLDEFYVDVAKITYKISFTPVSESYIDQKNKNGELYLFYINQDFAK GKMGAKNLHTLYFENVFSPENISKNFPIKLNAGNAELFFRPKSIESKKEKR NFVREIVNKKRYSEDKIFFHCPITLNRETGSYRFNNVNNFLSENNINII GVDRGEKHLAYYSVIDKNGVKIGGGSFNEINKVDYAKKLEERAGEREQ SRKDWQVVEGIKDLKKGYISQVVRELADLAIKHNAILVLEDLNMRFKQI RGGIEKSIYQQLEKALIDKLSFLVEKGEKDPNQAGHILKAYQLAAPFTSF KDMGKQTGIVFYTQASYTSKTCPNCGFRKNNNKFYFENNIGKAQDAL KKLKTFEYDSENKCFGLSYCLSDFANKEEVEKNKNKKRNNAPYSIEKK DCFELSTKDAVRYRWHDKNTERGKTFEGESVYEEKEEKEIGQTKRGL VKEYDISKCLIGLFEKTGLDYQNLLDKINSKGFDGTFYKNLFNYLNLFFE IRNSISGTEIDYISCEPCQFHTDKSKTIKNGDDNGSYNIARKGMIILDKIK QFKKENGSLDKMGWGELFIDLEWDKFAQKKNNNIIDK
13	Cas12	MKSFDSTNLYSLSKTLKFEMRPVGNTQKMLDNAGVFEDKLIQKKY GKTKPYFDRHLHREFIEEALTGVELIGLDENFRTLVDWQDKKNNVAM KAYENSLQRLRTEIGKIFNLKAEDWVKNKYPILGLKNKNTDILFEEAVFG ILKARYGEEKDTFIEVEEIDKTGKSKINQISIFDSWKGFTGYFKKFETR NFKYKNDGTSTAIATRIIDQNLKRFIDNLSIVESVRQKVDLAETESFSISL SQFFSIDFYNKCLLDQDGIDYNNKIIGGETLKNGEKLIGLNLINQYRQNN KDQKIPFFKLLDKQILSEKILFLDEIKNDTELIEALSQFAKTAEEKTKIVKKL FADFVENNSKYDLAQIYISQEAFTISNKWTSETETFAKYLFAMKSGK LAKYEKKDNSYKFPDFIALSQMKSALLSISLEGHFWKEKYYKISKFQEK NWEQFLAIFLYEFNSLFSKINTKDGETKQVGYLFAKDLHNLILSEQID IPKDSKVTIKDFADSVLTIYQMAKYFAVEKKRAWLAEYELDSFYTQPD GYLQFYDNAYEDIVQVYNKLRNYLTKKPYSEEKWLNFENSTLANGW DKNKESDNSAVILQGGKYLLGLITKGHNKIFDDRFQEKFIVGIEGGKY EKIVYKFFPDQAKMFPKVCFSAGLEFFRPSEEILRIYNNAEFKKGETYSI DSMQKLIDFYKDCLTKYEGWACYTFRHLKPTTEYQNNIGEFFRDVAED GYRIDFQGISDQYIHEKNEKGELHLFEIHNKDOWNLDKARDGKSKTTQK NLHTLYFESLFSNDNVVQNFPIKLNQAEIFYRPKTEKDLESKKDKKG NKVIDHKRYSENKIFFHVPLTLNRTKNDYRFNAQINNFLANNKDINII GVDRGEKHLVYYSVITQASDILESGSLNELNGVNYAEKLGKKAENREQ

		ARRDWQDVQGIKDLKKGYISQVVRKLADLAIKHNAAIILEDLNMRFKQ VRGGIEKSIYQQLEKALIDKLSFLVDKGEKNPEQAGHLLKAYQLSAPFET FQKMKGQTGIIFYTQASYTSKSDPVTGWRPHLYLYFSAKKAKDDIAK FTKIEFVNDRFELTYDIKDFQQAKEYPNKTVWKVCSNVERFRWDKNL NQNKGGYTHYTNITENIQELFTKYGIDITKDLLTQISTIDEKQNTSFFRD FIFYFNLICQIRNTDDSEIAKKNGKDDFILSPVEPFDSRKDNGNKL PEN GDDNGAYNIARKGIVILNKISQYSEKNENCEKMKWGDLYVSNIDWDN FVTQANARH
14	Cas12	MNTQKKEFNPKSFKDFTNLYSLNKT LRFSLTPNKKTAEIFNKKQKEVK CFSNDRKIAGAYQEIKKYLNKLHQEFIQEAMKFFAFSEELKGFEKEYLN LLNFTDKDNFKKKNKIRNEYEQERKILTIKIATYFSKFKSEKYQSFNLANI TGKKVFSILEQKYKEDKTKLIIHIFKYKPTKDEKKEGEAVNFSTYLTGFN ENRKNFYKSEDKAGQFATRTIDNLAQFIKNNKLFEDKYQKNYSKIGILD EQIKIFNLDYFNNLFLQEGLEDEYNGILGNNKGEENKSNEGINQKINIFK QKEKARLKKEKENFNKSDPFLFKELYKQIGSIRKENDVYVEIKTDKELVE ELNNFPKNVENYLKDIQSFYKTFEKLQNEEYELDKIYLPKSVGTYFSYIA FSDWNKLAFIYNKRYKNEKIKIVEGGDVNVQYRSLEVLKNRIDELKDED NLNFNKFFIDKLKFNEAKKENNWQNFWFCEIYYINSQFIGGEKNILNKE KNEYEILPFGSLKELKEKYFEAVKKYKEKMVDTESGLTDDEEKEIKETLK NYLDRIKIERIAKYFDLKKSFEEIKQEDLDSNFYGEYQKVVDKTNELKIY QYYSEFRNYLTQNNVVEEKIKLNFNSGLLDGWDNLKEKVKFSIIFQEN GKYLLGIINKEKDKTILDKDKHPEIFTKNSDFRKMELYKLPSPSKMLPKIS FSETAKKGDEDVGVWSEEIQKIKDEFAEFQEYKKKSKDNWKDEFNRGK LNKLIDYYKQVLEKHSEGYMNTYNFELKDSSKYKNLGEFNDDIARQNY KVKFVGIDKNYIDEKVANGELFLFQIYNKDFSEDKKEGSTNNLETIYFKE LFSKENLENPVFKLSGGAEMFFRNKIEKKKEKKKLDKDGKPMISKKEK VVDKRRFSENKILFHLPIEINYGKGKMPNPNKKINEYISKNPENIKIIGID RGEKHLLYYSIIDQNGNNIESMSLNAVDEFGNFVNPEKLEEYIDNNG KKERRWKYIVNDKEIKVTNYQRKLDELEKERQKSRQSWQNINKIKNLK KGYISFVVKIVDLAIENNAAIILEDLNFQFKSFRQKIEKNVYQQFEKALID KLGfVVDKQKQNRQFAPQLSAPFESFQKIGKQTGIVVYVLANNTSKVC PSCQWIKNFYLYEKKNTIFNLQKNQKLKVFEEQEKNRFRFEYQMSKE YISVYSDVDRQRYDKTKNQNKGGYLEYKNSNQKEIIDKDGVIQKQSITL QLKELFKENHIDLEKEILKQLDNKKEKNSGYTGVYNKFIYLFNLILQIRNA ISFREKDYIQCPSCHEFDRKENYKINDGDGNGAYNIALRGLYLLKGKN GIINNLEKIKLIFSNNDFYQWAKKLKNNK
15	Cas12	MEEKMLKSYDYFTKLYSLQKTLRFELKPIGKTLLEHIKNSGIIESDELEEQ YAIVKNIIDKLHRKHIDEALSLVDFTKHLDLTKTFQELYLKRKTDKEKEE LEKLSADLRKLIVSYLKGNVKEKTQHNLNPIKERFEILFGKELFTNEEFFLL AENEKEKKAIAFGFTTYFKGFQENRKNMYSEEGNSTSIAYRIINENL PLFIENIARFQKVMSTIEKTTIKKLEQNLKTELKKNLPGIFTIEYFNNVLT

		QEGISRYNTIIGGKTTHEGVKIQGLNEIINLYNQSKDVKLPILKPLHKQI LSEESTSFKIKAFENDNEVLKAIDTFWNEHIEKSIHPVTGNKFNILSKIE NLCDQLQKYKDKDLEKLFIERKNLSTVSHQVYGQWNIIRDALRMHLE MNNKNIKEKDIDKYLDNDAFSWKEIKDSIKIYKEHVEDAKELNENGIK YFSAMSINEEDDEKEYSISLIKININEKYNNVKSILQEDRTGKSDLHQDKE KVGIIKEFLDSLQQLQWFLRLLYVTPLDEKDYEFYNELEVYYEALLPLNS LYNKVRNYMTRKPYSVEKFLNFNSPTLLDGWDKNKETANLSIILRKN GKYLLGIMNKENNTIFEYYPGTKSNDYEEKMIYKLLPGPNKMLPKVFFS KKGLEYYNPPKEILNIYEKGEFKDKSGNFKKESLHTLIDFYKEAIAKNED WEVFNFKKNTKEYEDISQFYRDVEEQGYLITFEKVDANYVDKLVKEG KLYLFQIYNKDFSENKKSNGPNLHTIYWKGLYDSENKKNVYKLNGE AEVFYRKKSIDYPEEIYNHGHHEELLGKFNYPIIKDRRYTQDKFLFHVPI TMNFISKEEKRVNQLACEYLSATKEDVHIIGIDRGERHLLYSLIDKEGNI KKQLSLNTIKNENYDKEIDYRVKLDEKEKKRDEARKNWDVIENIKELKE GYMSQVIHIIAKMMVEEKAILIMEDLNIGFKRGRFKVEKQVYQKFEK MLIDKLNLYLVFKNKNPLEPGGSLNAYQLTSKFDSEKKGKQSGFIFYVP SAYTSKIDPTTGFIYQVDPNLEKGEFFSKFEKIIYNTKEDYFEFHCK YGKVFSEPKNKDNRKTKESLTYYNAIKDTVWVVCSTNHERRYKIVRNK AGYYESHVPDVTKNLKDIFSQANINYNEGKDIKPIIIESNNAKLLKSIAEQ LKLILAMRYNNGKHGDDEKDYILSPVKNKQGKFFCTLDGNQTLPINAD ANGAYNIALKGLLLIEKIKKQGGKIKDLYISNLEWFMFMMSR
16	Cas12	MNNYDEFTKLYPIQKTIRFELKPQGRTMEHLETNFFFEEDRDRAEKYKI LKEAIDEYHKKFIDEHLTNMSLDWNSLKQISEKYYKSREEKDKKVFLSE QKRMREQEIVSEFKDDRFDLFSKKLFSSELLKEEYKKGHNHQEIDALKSF DKFSGYFIGLHENRKNMYSYGDEITAISNRIVNENFPKFLDNLQKYQE ARKKYPEWIIKAESALVAHNKMDDEVFSLEYFNKVLNQEGIQRYNLALG GYVTSGEKMMLNDALNLAHQSEKSSKGRIHMTPLFKQILSEKESFS YIPDVFTEDSQLPSIGGFFAQIENDKDGNI FDRALELISSYAEYDTERIYI RQADINRVSNVIFGEWGTGGLMREYKADSINDINLERTCKKVDKWL DSKEFALSDVLEAIKRTGNNDAFNEYISKMRTAREKIDAARKEMKFISE KISGDEESIHIITLLDSVQQFLHFFNLFKARQDIPLDGAFYAEFDEVHSE LFAIVPLYNKVRNYLTKNLNTKKIKLNFKNPTLANGWDQNKVYDYAS LIFLRDGNYYLGIINPKRKNKIFEQSGSGNGPFYRKMMVYKQIPGPNKNL PRVFLTSTKGKKEYKPSKEIEGYEADKHIRGDKFDLDFCHKLIDFFKESIE KHKDWSKFNFYSPTESYGDISEFYLDVEKQGYRMHFENISAETIDEYV EKGDLFLFQIYNKDFVKAATGKKDMHTIYWNAAFSPENLQDVVVKLN GEAEFYRDKSDIKEIVHREGEILVNRTYNGRTPVPDKIHKKLT DYHNG RTKDLGEAKEYLDKVRYFKAHYDITKDRRYLNDKIYFHVPLTLNFKANG KKNLNKMMVIEKFLSDEKAHIGIDRGERNLLYYSIIDRSGKIIDQQSLNVI DGFYREKLNQREIEMKDARQSWNAIGKIKDLKEGYLSKAVHEITKM AIQYNAIVVMEELNYGFKRGRFKVEKQIYQKFENMLIDKMNYLVFKD APDESPGGVLNAYQLTNPLESFAKLGKQTGILFYVPAAYTSKIDPTTGF

		VNLFNTSSKTNAQERKEFLQKFESISYSAKDGGIFAFADYRKFGTSKTD HKNVWTAYTNGERMRYIKEKKRNELFDPSKEIKEALTSSGIKYDGGQN ILPDILRSNNNGLIYTMYSFIAAIQMRVYDGKEDYIISPIKNSKGEFFRT DPKRRELPIDADANGAYNIALRGELTMRAIAEKFPDSEKMAKLELKH KDWFEFMQTRGD
17	Cas12	MASSHFIISLDNSFSKFTNLVLSKTLRFELVPTENTTVMLENNNVFKKD QIIQVKYEKTKPFIDRLHREFIKEALSNYAVSGLQEYFEILRAGGKKANLD SAKKQLRKHVVDQFNATASLWVSRHKDVGFKGEGIELLFKEAVFKLLK EKYGTDMNALIEDNHGKQISIFDSWKGFTGYFDKQQTTRNLYKDDG KEGRVATRIIDQNLTRFCDNIFVYEKIKDKVSFIDVEKSFGKTCSEVFIPD YYNTCLLQDGIDSNEFIGGKPLENGEKVQGLNELINLYRQTTGDKVPY FKKLEKQILGEKDEVFIDEITDEDFVPRVLA FYRTVDAKYKFLKLLDDFV TNQDVYELSQIYISKKGLQEKLRYWLTPSAREVYDEELFEVLKAKKVN NKDKQKVSGYVPDFVEVLYIKQALENIDAKLIWSDRYSDGENEGIIDK GFSSWKQFLVILNHEYRQLLSFEDHVIDKELDFDKEVKQLTDTVEIVSQ DKNARTVTYRGGYDVYKAKLAELGQSFEKDTCTKKVIKNFADSVLSMY HFAMMFAVWDDTYPLDVFTNNEFGYLLYEDAYKNIVQEYNKLRN YLTKKPYSTEKWKLNFENPTLAAGFDKNKESDNSTVILRQGDKYFLGV MKKGFNKIFDNSQISQGTGNSPEAYFEKMVYKYTKDVVTGIPKSSTQVK EVQEHFRNSDEDFLEECSSVGNFIVPLKITKEIFDLNNKVYAKEDISQA MYRWALNTDEEKNYVKSQKSYLSLGGSPELYCKSVTLWIGFCLNFLK SYPSAAYFDYSQLRQASDYESVDECYQELNNAGYTILFQNVSEKYVRV KNKNGELYLFQIKNKDWNENEGSTGKKNLHTLYFESLFSKENAKQGFPFK LSGNAELFFRPGSIEQTYERRNFPREIPLKRRYSKDGIFFHIPVQVNRTK VGSPNQFNKEVNDFLAGNPINIIIGVDRGEKHLVYYSVISQNGEKIDG GSFNEINGQDYHDKLEKRAKEREQRRDWETVEGIDLKKGYISQVV KKLADLAIEHNAIIVMEDLNMRFKQIRGGIEKSVYQQLKALIDKLSFLV NKGEVDPQKAGHLLKAYQLTAPIDAFKDMGKQTGIMFYTQAAYSKI DPVTGWRPHLYLYKYSSVEKAKDDISRFTKIAYKNDRFEFTYNITDFRTQ KEWPLKTEWTVCSVERFRWNKKLANGKGDYEHYPNVTDDFKKLF SVGINYLQENIKSQVNLNLDENTNVEFFREFIKLFALVCQIRNTNSEEAG NLNDFILSPVEPFDSRSAEDFGKGLPSNGDENGAYNIARKGMIILNTL STFKNDHGSCEGLSWGDLISDTQWDDFAQSFHG
18	Cas12	MDAKEFTGQYPLSKTLRFELRPIGRTWDNLEASGYLAEDRHRAECYPR AKELDDNHRAFLNRVLPQIDMDWHPIAEAFCKVHKNPGNKELAQD YNLQLSKRRKEISAYLQDADGYKGLFAKPALDEAMKIAKENGNESDIE VLEAFNGFSVYFTGYHESRENIYSDMDVSVAYRITEDNFRPFVSNALI FDKLNESHPIIIEVSGNLGVDDIGKYFDVSNYNNFLSQAGIDDYNHII GGHTTEDGLIAFNVLNLRHQKDPGFEEKIQFKQLYKQILSVRTSKSYI PKQFDNSKEMVDCICDYVSKIEKSETVERALKLVRNISSFDLRGIFVNKK NLRILSNKLIGDWDIAIETALMHSSSENDDKKSVDYSAEAFTLDDIFSSVK

		KFSDASAEDIGNRAEDICRVISETAPFINDLRAVDLDSLNDGGEAAVS KIRELEPYMDLFHELEIFSVGDEFKCAAFYSELEEVSEQLIEIPLFNKA RSFCTRKRYSTDKIKVNLKFPTLADGWDLNKERDNKAAILRKDGKYLLA ILDMKKDLSSIRTSDEDESSFEKMEYKLLPSPVKMLPKIFVKSAAKEY GLTDRMLECYDKGMHKSASFDLGFCHELIDYYKRCIAEYPGWDFD FKFRETSYDYSMEKFEDVAGAGYYMSLRKIPCSEVYRLLDEKSIYLFQI YNKDYSENAHGNKNMHTMYWEGLFSPQNLESPVFKLSGGAELFFRK SSIPNDAKTVHPKGSVLVPRNDVNGRRIPDSIYRELTRYFNRGDCRISD EAKSYLDKVKTKKADHDIVKDRRFTVDKMMFHVPIAMNFKAISKNL NKKVIDGIIDDQDLKIIDRGERNLIYVTMVDKGNILYQDSLNLNGY DYRKALDVREYDNKEARRNWTKEGIRKMKEGYLSLAVSKLADMIIE NNAIIVMEDLNHGFKAGRSKIEKQVYQKFESMLINKLGYMVLKDKSID QSGGALHGYQLANHVTTLASVGKQCGVIFYIPAAFTSKIDPTTGADLF ALSNVKNVASMREFFSKMKSVIYDKAEGKFAFTFDYLDYNVSECGR LWTVYTVGERFTYSRVNREYVRKVPTDIIYDALQKAGISVEGDLRDIA ESDGDTLKSIFYAFKYALDMRVENREEDYIQSPVKNASGEFFCSKNAG KSLPQSDANGAYNIALKGILQLRMLSEQYDPNAESIRLPLITNKAWLT FMQSGMKTWKN
19	Cas12	MVNKQNERGDFDDLNLNLYEISKTLRFELVPVGETDRMLKEENVFKVD ENIKRKYQQTKLFFDRIHREFAKEALSVEGILSELEEYLAIFIEWRKDKKI HEKTLNQKEKELRKQVVSFAFNAMANKWIERYGDVNLKKKNVEFLFEE GIFRVLKERYGEEDGSTITASDTGEVFSIFDSWKGFTGYFAKFFETRKNF YKDDGTATAIATRIVDENLRRFCDNLIVAQRLTENIDFSEVENNFQIKIK EVLFMEFYNKCLLQDDIDFYNKVIGGETLKTGEKLGKINELVNLHRHKT GEKLPFLKTLDKQILGRKEQFLDEIESEEEELLEKLKDFQNVATKKIKVIKSL FGDFVENNENYDLEKIYISKAFNTISRKWTGETEQFEKLLFESMKS PAGLKYDKKENNYKFPDFIAVSYIKDALENFSGEQKFWKDRYIELELD NQVVKQFLDIFYWEFSSLFKRSFVNKETGEISEVGCDFEKKFINLIDD FEYNQKSKILIKDFADSVLSVYQMANYSLEKKRWSTEFETDSKFYDD SEIGFRNCFYEDVFEGIVQVYNKLRNYLTKKPFSEEKWKLNFNPTLAA GWDKNKEKDNSTVILRKDEKYFLAIMKKGNNVIFDDRNLKALFSQNL HGKYEKVVYKFAKDVTLGIPKSTTQTKSVIAHFKNSEDEYQITNGSAVG DFLEPLVVTKRIFELNNKIYSKNNLGKVLRYSEVSKDKQKEYIKLFQKKYL VLGGNKNLYRDAVKEWIDFCKSFIKVPSYKYFDFSLKEAVEYNSVDE FYKELNSYGYAISFQDISCDYIEKNKNGELYLFQIKNKDWNKGSTGMK NLHTLYFESLFSEENIKNNFVTKLNGGAEIFYRPKTSKEKLGKRIVRNG QEVFVNHKRYSEDKIFFHCSIALNRGKGKLLKFNARINDLLANNPDI VIGVDRGEKHLAYYSIIDQKCKILDSGTLNEVGAKVDYHEKLSNRAKRR EDGRRDWGWGQJEDIKNLKKGYVSQVVKLAELIYKYNAILVFEDLN MRFKQIRGGIEKSIYQQLKALIDKLNFLVKKGEKDSKSAGHLLKAYQL AAPFETFDKMGKQTGVIFYTQASYTSKIDPITGWRPNLYLKHSNANDS QKKIAKFSRIEFINDRFEFYDLKKFIEMKEVPENTKWTLCSVCVQRYRW

		NRKLNANKGGYDSYNDLTKNFKALFESVGIDIKKNIKEQIVKMEIKGNE KFFKSIFYWQLLCQIRNTDELKKGDDNDFILSPVEPFDSRKKNGDDL PKNGDDNGAYNIARKGVIVLNKISEFSKQNGNCEKCGWKELYVSAKD WDDFVQAK
20	Cas12	MQNKQSFADFTNLYSLSKTLRFELKPIGQTQAMLDENKIFEVDENRKK AYDKTKPYFDRHLHREFINESLSNAQLKGISEYFETFKQFRSNQNNKDLK ELINKQQKFLRHQIVTLFDENGKHWATTKYAHLKIKKKNLDFDEQVF YILKERYGSEKETQLVDKETGAVTSIFDNWKGFTGYFTKFFETRKNFYK SDGTSTALATRIIDQNLNRRFDNLETFHKIKDKIDVKEVEIFFKLKADNV FSIDFYNQCLLQNGIDKYNDFLGGQTLERGEKQKGINEIINKYRQDNK DQKLPFLKKLDKQILSEKDRFINEIESKEEFFQVLTEFYQSATVKVTIITL LNDFVHNTDKYKLEKIYLTKEAFNTIANKWTDETQIFEDNLDLVLKNNK ITAKQDFIPLAYIKEALEVIEKDRKFFKDRYYNDPQIGFFPDQSYWEQFL AILNFEFMTHFQRVAKDKITGKKIELGYFVFEKRIKELLSDPSLNSQSKI IIEFADEVLFHIFQMAKYFALEKKREWKGDDYQLDDQFYNHIDYGFKD QFYENAYEKIVQPYNKIRNYLTKKPYSDVKWKLNFNGPTLANGWDKN KEADNTAVILKKDGNYYLGVMMKKGKNKIFSDQNKEKYKAYNSAYYEKL VYKLPDPSPKMFVKVCFSKKGLNFFQPSSEILRIYKNNEFKGNTFSISS MQKLIIFYIDCLGLYEGWKHYEFKNIKDVRQYKENIGEFYADVAESGY KLWFEKISEEYITQKNQLGELFLFQIYNKDFAKKTTGRKNLHTIYFEELFS QTNIDNNFPFKLNGQAELFYRPSLEKIEEKRNFKRSIVNKKRYTQNKIF FHVPIITLNRSENIGRFNVRVNNFLANNSNVNIVGVDRGEKNLAYYSII KQNGEVLKSGSLNIINGVDYHALLTDRAQRREQERRNWQDVESIKDL KRGYISQVVHELVSIAIKYNAIIVMEDLNMRFKQIRGGIEKSTYQQLK ALIEKLNFLVNKEETDSNQAGNLLNAYQLTAPFKTFKDMGKQTGIIFYT QASYTSKIDPLTGWRPNILRYLSNAKQAKADILMFTNIYFEKKDRFEF TYDLEKIDDKRDLPIKTEWTVCSNVERFSWEKSLNNNKGYYVHYPIQ DSNGEESITSKLKLFMDFGIDLTDIKTQIESLDTNKKDNANFFRKFIYF QLICQIRNTQVNSDDGNDFIFSPVEPFDSRFADKFRKNLPKNGDEN GAYNIARKGLIILHKISDYFVKEGSTDKISWKDLSISQTEWDNFTTDK
21	Cas12	MDKQKNKLQNFTNLYELSKTLRFELKPVGETQHLLKENKVFGIDGNIK KKYEATKPFDRHLHRKFVKEALVNIALGGLDNYLEVYKKFTNDRKDKEN QKELEKQEKLLRKQIKIFFDSQANQWKEKYNKINFKKSGNLIFEESIFQ LLKEIYGKEDDAFLKNDDNEFIFDKDGNKISIFDSWKGTGYFKKFFETR KNFYKDDGTSTAIATRIIDQNLRRFCDNIFIYNNKIKNKLDFSSLEKEQDV VLEEFTTAYYMDCILQDDIDLYNGVLGGETLDDGTIKGLNEIINKYRQ DNKGDKIPFFKKLDKQILSEKDRKFLDEIESEEELAECLKIFINNTAKVKV FDELVNQLCVNDSDFELDKIYISKEAFNTISHKWTNQTHEFERVLFEEM KPKITGLDYKKAEDKYKFPDFIALKYIISLNTLDKDESEFWKSHYYKTEE NQNAILSLEEKVGEQFLQIYKYELQRLHSRNVNVENKDGKMKKEIGL DYSLTTVKELLKNFKLTDKSKIIKDFADNVLQYYQLAKYFSVEKNREWN

		YTKLELADFYINPDFGYEIFYGNAYEEIIQIYNKLRNYLTKKPFSEEKWKLN NFENPTLAGGWDKNKERGNATVILRKNEKYLLGIMAKGYNDIFTDKN KDKFDGEGYEKMVYKLFPGPNKMMPKVCFSKKGLDFEPSEKIIDIYK DGKFKQGDTSIDSMQQLIDFYKRALREYNGWKMYDFSLLKDTNDYT TNIGEFYNDVACAGYKVWFDNISEEYIQEKNENGELYLFEIHNDWNL KDEKKKTGKTNLHTLYFESLFSDENALRDFVMKLSGEAELFFRPKTNAD KLGyrKDKKGNKVVKNKRYSEDKMFLHLSINLNRGKGQAFWFRNRIN NFLANNSDINVIGIDRGEKHLAYYSVISQQGEILDNGSLNEIAGVDYYA KLSKRAKEREGRKDWQAVSDIKNLKKGYISQVVRKLADLAIEHNAIIV LEDLNMRFKQIRGGIEKSIYQQLEKALIEKLNFLVNKKIDS SDKAGNLLR AYQLTAPFETFQKMGKQTGIIFYTQASYTSKIDPLTGWRPNLYLKKGN AKINKEQIEKFSKIEFTNNRFEITYDLKNFGDKKKYPQKTKWTLCSSVE RWRWDRKLNNKGGYIHYEDLTTEFKSLFEKFEIDIEGDILEQIKTIDEN DRNNARLFSGYIYLWGLLSQIRNTDGELDEKIKKLEREDKNEEISEKEKF DVFILSPVEPFDSRTPEKFGENLPKNGDDNGAYNIARKGIITLERIKK FYELSDKEREKLYPDLFITNAEWDDFATKRDS
22	Cas13	MDNNTTLEKTELGLGITYNHDKVEDKHYFGGFNLAQNNIDLVAQEF KKRLLVQGKDSINIFSNYFSQCSITNLERGIKVLSEYFPVIFYFDLDENN KSKSIRQHIILLDTINNLRNYYTHYHKKVIIDDALYPLDITLLKVLEIK KKKLKEDKTKQLLKKGLEKEMAILFNLMKKEQKEKKIKGWNIDKNIG AVLNRAFSHLLYNDGISDYRKSNTEDENLKDLSSEGILFLLSFFLNKK EQEQLKANIKGYKGKIASIPDEEITLKNNSLRNMATHWYSHLTYKGLK HRIKTDHEKETLLVNMVDYLSKVPNEIYQNLSEQNKSFLFEDINEYMR DNEENNDSSSEASRVHPVIRKRYENKFAYFAIRFLDEFAEFPTLRFMVN VGNYIHDNRKDDIGGTSITNRTIKQQINVFGNLTEIHKKKNDYFEKEE NKEKILEWELFPNPSYHFQKENIPIDLEKSKETNELAKEYAKEKKIFG SSRKKQQNTAKKNREAIINLVFDKYKTSRKTVTFEQPTALLSFNELNA FLYAFLVENKTGKELEKIIIEKIANQYQILKNCSSVDKTNDSIPKSIKKIA HPTTDSFYSEGKKIDIEKLERDIKIEIEKTNEKLETIKENETSAKNYKRNER DIQKRKLYRKYVFFTNEIGIEATWITNDILRFLDNKENWKGQYHSELQK FISQYDNYKKEALGLESEWNLESEAFFGQKLKRIFQSNFTFETFYKKYL DNRKDTLETYLSAIENLKTMTDVPPKILKKSWAELFRFFDKKIYLLSTIET KINELITKPINLSRGVFDEKPTFINGKSPNKENDQHFLFANWFIHAKEQTI FQDFYNLALETPEINNLLKQNYKLERSINNLIKIEDIYIKQMVDFLYQKL FEQSFKGSLQDLYTSKEKREVEKSKAKNEQTPDESFIWKKQVEINALN GRIIAKTIKIDIGKFNLLTDNKHLSYDNRIWNFSLDNDGDTTKKLYS LNTELESYERIRREKLLKQIQEFEQFLKQETEYSAERKHPEKFEKDGNP NFKKYIIEGMLNKITPVNEIEELEILSKEDVFKIDFNEIVKLNNESIKKGY LLIMIRNKFAHNQLIDKNLFTSLQLYSKNENENFSEYLDKVCQKIIQEFI EKLK

23	Cas13	MNETDYLAKRLEYNYASIEDKHIFGGYFNLAQNNINDLSKAFKEKFG MKPKSCILDFFTQDKAIAEYQLGVEFLQKNLPVIRYLYLPTSHKRFENVP KNQLISEQRNYFKNSLKVKNLIRDYRNFYTHHFKPIPVFPETYKLLDD LFLAVANDVKKHRMKT DASKQLKKGLIEELAQLEKLKLEDLKKLREG KKVNLNDKEAITNAILNDSFSHLLPKENTISKYYSAPPTEDIDTENGVTIS ESGII FLLGLFLT KQSEDLRSRVKGFKAKLIVNPENPINKNNLSKYMA THWVFGYLGFGLKNRFTTTFTKDTLLAQIVDELSKVPDELYQVLPEEL KNEFLED MNEYLKEENSESLDKATVIHPVIRKRYENKFAYFALRFLDEFV DFPTLRFQLHLGNVYHDKREKPIEGTKYVTERIVKEKIFAKLSEAAQL KQKYFEEKENHQSIGLQLYPNPSYNFVGNNIPIHLNLNEHFFPKEVKIV AGRLKKRNSSYKSDHPEEYKVRTDNKIKPDAILQDLGKPEKLAPVAML SLNELPALLHLVLT KKTPEEIEIIAQKIAERYNVLTNYKAGDDISKGQITK NLLKAKQKKEVNLDKLQLAIEKEIAVTNDKLQTIALHIKERNDPKQKRK YVFTNKEIGLQVTWLANDLKRFPKGSQRQNW RGQHHSQ LQKSLAFY DIQKPEPLSLEEVD FKN EAYLWNGIRRSFDRDFISFYTSYLN NRK ETFQRFDQLNGIRSNNKILDKFIKQQHLWNLFHKRLYVIDTIEEQVEKL LVKPMQFPKG VFDHKPTYIKGKSIQENPECFADWYVAWNQHTDYQK FYSWDRDYKSAYLSGEQEKEKTEKRFIRVQGS KINKVKQ QDVLLAKMASII FNELYLPEDA EHLDLNLSDIYKTQTERKAEIEAALIQSHKTTGDNSANI IK STSAWTLTPYCSKNIYEPQVKLKELGKFKKFIASQKVQTLFEYKPKQI WNKTELEEVLKANSYEVIRRDYLLKSIQEF EKYMIKKLPTLIDTNEHP NFNKYLTTF LKSLVSEEDAKWLISKKDFDTPIDELKKQSKIMEKAFLL VMIRNKFSHNQLPRKIYYDEIYKNVPNAV SINFNELFLEYTNQTILEFK
24	Cas13	MESIIGLGLSFNPHYKTADKHIFGSFLNLVENNLNAVFAEFKERISYKAK DENISSLIEKH FIDNMSIVDYEEKISILNGYLP IIDFLDDELENNLNTRVKN FKKNFIILAE AIEKL RDYYTHFYHDPITFEDNKEP LLELLDEVLLKTILDVK KKYLKTDKTK EILKDSLREEMDLLVIRKTD ELREKKTNPKIQHTDSSQIK NSIFNDAFQGLLYEDKGNNKKTQVSHRAKTRLNPKDIHKQEERDFEIP LSTSGLVFLMSLFLSKKEIEDFKSNIKGFGKGVVKDENHNSLKYMATHR VYSILAFKGLKYRIKTD TFSKETLMMQMIDELSKVPDCVYQNLSETKQK DFIEDWNEYFKDNEENTENLENSRVVHPVIRKRYEDKFNYFAIRFLDEF ANFKTLKFQVFMGYIHDQRTKTIGTTNITTERTVKEKINVFGKLSKMD NLKKHFFS QLSDDENTDWEFFPNPSYNFLTQADNSPANNIPIYLELKN QQIIEKDAIKAEVNQTQNRNPNKPSKRDLLNKILKTYEDFHQGDPTAI LSLNEIPALLHLFLVKPNNKTGQQJENIIRIKIEKQFKAINHPSKNNGIP KSLFADTNVRVNAIKLKKDLEAELDMLNKKHIAFKENQKASSNYDKLLK EHQFTPKNRPELRKYV FYKSEKGEEATWLANDIKRFPKDFKTKWK GCQHSELQRKLAFYDRHTKQDIKELLSGCEFDHSLLDINAYFQKDNFE DFFSKYLENRIETLEGVLKKLHDFKNEPTPLKGVFKNCFKLKRQNYVTE SPEIIKRILAKPTFLPRGVFDERPTMKGKGNPLKDKNEFAEWFVEYLE NKDYQKFYNAEEYRMRDADFKKNAV IKKQKLKDFYTLQMVNYLLKEV FGKDEMNLQLSELFQTRQERLKLQGI AKKQMNKETGDSSENTRNQTY

		IWNKDVPVSFFNGKVTIDKVKLKNIGKYKRYERDERVKTFIGYEVDEK WMMYLPNHNWKDRYSVKPINVIDLQIQEYEEIRSHHELLKEIQNLEQYIY DHTTDKNILLQDGNPNFKMYVLNGLLIGIKQVNIPDFIVLKQNTNFDKI DFTGIASCSELEKKTIIILAIRNKFHNLQPNKMIYDLANEFLKIEKNETY ANYYLKVLKKMISDLA
25	Cas13	MEDKTTGAGISYDHTLMEDKHFFGGFLNLAQNNIDALLKAFKERFNV RYQSKQFAEVCFSKLPDQDYLDRTLFLFETHLPFIKYIGGKEANNRGT RKNITLFFESIEQLRNFYTHYYHKPILFPEELYENLDRIFVEVSKEVTKHV KNDQTRHLLTKNLANELDIRYKKNVEKLKELKAQGGKVNHDKEAIKNS VLNNAFNHLYKKEEDVFATEAYKSKYNLEDPSKNGISLSQSGLLFLSM FLNKKDIEALKSRVKGFKAKIIRDGEENISGLKFMATHWVFSLSFKNV KHKLSTDFHKETLLIQIVDELSKVPDEVYKTFDKQTQEEFIEDINEYMKV GNKDLSEESTVIHPVIRKRYDNKFNYFALRFLDEFAGFPTLRQVHIGN YIHDRRIKNIDGTAFQTERSVKERIKVFGKLSQMSNLKAEYVSGLMDEP VDTGWEIFPNPSYNIENNIPIYIEMGDHFNDEVLSKMARKKQKPEE LKDRNSAKASKESMIQTLQNDKGLMDVITVSPTAQLSNELPAILYELL VKKTPAKTIEKKLVGKLNQRLKEIKNYNPEKPLPASQISKRLRLNREESI NTKKIALLQKELNYTQEKLDLLEKNRKEYGKKVDGKILRKYVFGLEIG NLATDMAMDIKRFMPANVRKEWKGYQHSQQLQQLAFYDKRPEEAF NILQEVWDINREKSLWDTWILNAFQTSNGNFERFFELYHEGRKKYIQQ QLENIDRYTDNKKFLQKFINQQFPTNFLEKRLYTLSEIEKLKILSKPFIL PRGTFDEKPTFIMGEKVTENPELFADWYTYGYQQHEFQKFYSWPRDY KDLLQNEQKRPDFAENKKGLSDLKQLELLQLKQDIKKIKTQDLYLKI MDALFIEVFGQEADISLNDLYLTQEERLEKEKLALQHQHVRGDDSPN VIKDNFIWSKTTPYKHKDIYEPQVRLKDFGKFKHFLDDKVAKILSYDL QETWNKNELEIQINTGQDSYEVIRREELLKEIQLLEKQILETFSHTLDEH PKEFEDEKGNPNFKMYMANGVIRKGSSTAKDEADWLEHEKDFDNL SLEIFNSKSEITQLTFLIVLIRNKFHNLQPLIKQFYEIQQNEYSITGETISRLY LNFIIYAKARLKDLM
26	Cas13	MEEKLGKGVYENPFKKEDKYFFGGYFNLAENNINEVFKEVKKRLGETN SSSNIELLNNVFRKEMSLVDYEKVVNAFADYFPIVNYLDRETIKKGEKV VEVPREKRIECFRDMFKGLINTISQLRHYYTHYHHEPIEIDDKILSFLDEV LFNTIITTKNKYLKTDKTKELIKDSLQEELDILCKLVKYLESKRRFRDRKD KGAIENAVYNDVFRRIYKDEKGNESLKDIIRTKQIKVHQNSSYLELPIS SGIIFLLSLFLNKKEVESLKSNIIRGYKGSKSEETTPKNGLLFMTHRIYS VLAYKGLKKRIKTSVKGDKETLLMQMIDEVSKVPHCIYQNLDTLQAT FIEDWNEYFKDNEEENLENSRVLHPVIRKRYEDKFNYFAIRFLDEYA EFPSLRFQVNLGNYVHHKATKKFGNSEVTTERVIKDKITVFGRLSEVVK AKADFFKNETELDPAWELFPNPSYEFKPKGNNDKDAGKIGIQVKLLN KDIEAVLNEKNTLNNKTRKSDKISKKEIINKIVQINDDTKYNNKNIYQ GNAIAYLSLNDIHSLLYELLVIGTKGDKLERKVVKEIQQQVTEIRNKDTS

		AKILSKYKDSEESNTIDKKKLVIDLKYEYDKLQDLLKEHKNREEDYIQTKK KKKDSPPKRYILYHNEKGQVAVWLSNDIKRFMPQNFKEKWGYQHS EFQKSLAYYETNKEMLKILQDLDEQFPFDIKSCFYKNTLEDFYNRYLSL RISYLENVIDRVECFSNPKAFKSVLKECFVFLKKQNYTNHSLDEQVKKI LANPIFIERGFLDTKPTMIQGVKFSENKGCADWFVHYKEYEHYQKFY DTNLYPVESIEDKERQKLEATIKKQQKNDVFTLLMIKKIFNDLNFQDFE ANLYEMYQSKEEREKNQLVAKETQNRNLNFIWNKPIAIDLFDGKVKID EVKLKDVGSFRKYENDKRVQTFITYPEIQWIPYLPNTWEGINLPVNVIE RQIDRYEKVRSEELLKEVQAIEKYIYEQVNDKTELLQNGNQNFKNYLVN GLLKQIQGIDVSNFKFINQQKFETINVKDLNEASALEQKVYVLINIRN QFSHNQFPKSAFYQFCQKILSIEDELFADYLRFLKLLRNELLD
27	Cas13	MNTRVTGMGVSYDHTKKEDKHFFGGFLNLAQDNITAVIKAFKIFDK NPMSSVQFAESCFTDKSDTDFQNKVRYVRTHLPVIGLYNYGGDRNT FRQKLSTLLKAVDSLRFYTHYHSPLALSTELFELLDTVFASVAVEVKQ HKMKDDKTRQLLSKSLAEELDIRYKQQLERLKEQKGNIDLRDEAGI RNGVLNAAFNLHIYKEGEIAKPTLSYSSFFYGADSAENGITISQSGLLFLL SMFLGKKEIEDLKSRIKGFKAIVRDGEENISGLKFMATHWIFSYLSFKG MKQRLSTDFHEETLLIQIIDELSKVPDEVYHDFDTATREKFVEDINEYIR EGNEFSLGDSTIIHPVIRKRYENKFNYFAVRFLDEFIKFPSLRFQVHLG NFVHDDRRIKDIHGTGFQTERVVKDRIKVFGLSEISSLKTEYIEKELDLS DTGWEIFPNPSYVFIDNNIPIYISTNKTFKNGSSEFIKLRKKEPEEMKM RGEDKKEKRDIASMIGNAGSLNSKTPLAMLSLNEMPALLYEILVKKTP EEIELIIEKLDSEHFENIKNYDPEKPLPASQISKRLRNNTTDKGKKVINPE KLIHLINKEIDATEAKFALLAKNRKELKEKFRGKPLRQTIFSNMELGREA TWLADDIKRFMPDILRKNWKGQHNQLQQLAFFNSRPKEAFTILQD GWDFADGSSFWNGWIINSFVKNRSFEYFYEAYFEGRKEYFSSLAENIK QHTSNHRNLRRFIDQQMPKGLFENRHYLENLETEKNKILSKPLVFPR GLFDTKPTFIKGIKVDQPELFAEWYQYGYSTEHVFNQFYGWERDYN DLLESELEKDNDFSKNSIHYSRTSQLELIKQDLKIKKIKIQDLFLKLIAG HIFENIFKYPASFSLDELYLTQEERLNKEQEALIQSQRKEGDHSDNIIKD NFIGSKTVTYESKQISEPNVKLDIGKFNRFLDDKVKTLTLLSYNEDKVW NKNDLDLELSIGENSYEVRREKLFKKIQNFELQTLTDWPWNGTDHPE EFGTTDNKGVNHPNFKMYVVGILRKHTDWFKEGEDNWLENLNET HFKNLSFQELETSKSIQTAFLIIMIRNQFAHNQLPAVQFFEFIQKKYPEI QGSTTSELYLNFILAVVELLELLEK
28	Cas13	METQILGNISYDHTKTEDKHFFGGFLNTAQNNIDLLIKAYISKFESSPR KLNSVQFPDVCFFKNDSADDFQHKLQFIRKHLPIQYLYKGGNREVLEK EKFRLLQAVDSLRFYTHFYHKPIQLPNELLTLLDTIFGEIGNEVRQNK MKDDKTRHLLKKNLSEELDFRYQEQLERLRKLKSEGKKVLDLRDEAIRN GVLNAAFNLHIFKDAEDFKPTVSYSSYYYDSDTAENGISISQSGLLFLLS MFLGRREMEDLKSRRVGRFKARIKHEEQHVSGLKFMATHWVFEFCF

		KGIKTRLNADYHEETLLIQLIDELSKVPDELYRSFDVATRERFIEDINEYIR DGKEDKSLIESKIVHPVIRKRYESKFNYFAIRFLDEFVNFPTRLRFQVHAG NYVHDDRRIKSIEGTGFKTERLVKDRIKVFGLSTISSLKAEYLAKAVNITD DTGWELLPHPSYVFIDNNIPIHLTVDPSEFKNGVKEYQEKRKLQKPEEM KNRQGGDKMHKPAISSKIGKSKDINPESPVALLSMNEIPALLYEILVKK ASPEEVEAKIRQKLTAVFERIRDYDPKVPLPASQVSKRLRNNTDTLSYN KEKLVELANKEVEQTERKLALITKNRRECREKVKGKFKRQKVFKNAELG TEATWLANDIKRFMPPEEQKKNWKGYSQSQLQQSLAFFESRPGARS LLQAGWDFSDGSSFWNGWVMNSFARDNTFDGFYESYLNGRMKYFL RLADNIAQQSSTNKLISNFIKQQMPKGLFDRRLYMLEDLATEKNKILSK PLIFPRGIFDDKPTFKKGVQVSEPEAFADWYSYGYDVKKHFKQFYAW DRDYELLREELEKDTAFTKNSIHYSRESQIELLAKKQDLKVKVRIQDL YLKLMAEFLFENVFGHELALPLDQFYLTQEERLKQEQAIVQSQRPKG DDSPNIVKENFIWSKTIPFKSGRVFEPNVKLKDIGKFRNLLTDEKVDILL SYNNTGKQVIENELIIGAGSYEFIRREQLFKEIQQMKRLSLRSVRGMG VPIRLNLK
29	Cas13	MENQTQKGGKIYYYYTKNEDKHFGSFLNLANNIEQIIEEFIRLSLK DEKNIKEIINNYFTDKKSYTDWGERGINILKEYLPVIDYDLAITDKEFEKID LKQKETAKRKYFRTNFSLIDTIIIDLRNFYTHYFHKPISINPDVAKFLDKN LLNVCLDIKKQKMKTDKTKQALKDGLDKELKKLIELKKAELKEKKIKTW NITENVEGAVYNDAFNHVMYKNNAGVTILKDYHKSILPDDKIDSELKL NFSISGLVFLSMFLSKKEIEQFKNLEGFKGKVGIGENG EYEISKFNNSLK YMATHWIFSYLTFKGLKQRVKNTFDKETLLMQMIDELNKPHEVYQT LSKEQQNEFLEDINEYVQDNEENKKSMENTSIVVHPVIRKRYDDKFNYF AIRFLDEFANFPPTLKFFVTAGNFVHDKREKQIQGSMILTSRMIKEKINV FGKLTEIAKYKSDYFSNENTLETSEWELFPNPSYLLIQNNIPVHIDLIHNT EEAKQCQIAIDRIKCTTNPAKKRNTRKSKEEIIKIYQKNKNIKYGDPTAL LSSNELPALIYELLVNKSGKELENIIVEKIVNQYKTIAGFEKGQNLNSLI TKKLKSEPNEDEKINAEEKIILAINRELEITENKLNIIKNNRAEFRTGAKRK HIFYSKELGQEATWIAIDLKRFMPASRKEWKGFHHESELQKFLAFYDR NKNDKALLNMFWNFDNDQLIGNDLNSAFREFHFDKFEKYLIKRDEI LEGFKSFISNFKDEPKLLKGIKDIYRVFDKRYIIKSTNAQKEQLLSKPIK LPRGIFDNKPTYIEGVKVESNSALFADWYQYTYSDKHEFQSFYDMPRD YKEQFEKFELNNIKSIQNKKNLNKSDKFIYFRYKQDLKIKQIKSQDLFIKL MVDELFNVVFKNNIELNLKKLYQTSDEFKNQLIADVQKNREKGDTS NKMENFIWNMTIPLSLCNGQIEEPKVKLKDIGKFRKLETDDKVIQLE YDKSKVWKKLEIEDELENMPNSYERIRREKLLKGIQEFEFHLEKEKFDG INHPKHFEQDLNPNFKTYVINGVLRKNSKLNYTEIDKLLDLEHISIKDIET SAKEIHLAYFLIHVRNKFHGNQLPKLEAFELMKKYYKKNNEETYAEYFH KVSSQIVNEFKNSLEKHS

30	Cas13	MEKTQTGLGIYYDHTKLQDKYFFGGFFNLAQNNIDNVIKTFILKFFPER KDKDVNAAQFLDICFKDNDADSDFLKKTFLRMHFPVIGFLASNNDK AGFKRKFSLLLKAISELRNFYTHYYHQPIEFPSSELFELDDIFVETTSEIKKL KKKDDKTQQLLNKNLSEEDIRYQQQIERLKELNAQGKKIPLNDETAIR NGVFNAAFNHLYKDGDDLKPSRVYQSSYSEPDPAENGTSLSQSSILFL LSMFLEKEDLKSrvkgfKAKFIKNGEEKISNLKLTATHWVFSYLCFK GIKQKLSTEFHEETLLIQIIDELSKVPDEVYSAFGAKTKQKFVEDINEYMK EGNADLSLEDSKVIHPVIRKRYENKFNYFAIRFLDEYLSSTSLKFQVHVG NYVHDDRRIKNGINGTDFQTERVVKDSIKVFGRLSKISNLKADYIKEQLSLP NDSNGWEIFPNPSYVFIDNNVPIHIQTDEATKNGIKLFKOTRRKEQPEE LQKRKGKLSKHNIIEIFKETKGKDKPRVDEPLALLSLNEIPALLYQILEKG ATPEDIELIKNKLAERFEKIKNYDPETPAPASQISKRLRNNTTAKGQETL NAEKSILIEREIEDTETKLDIEEKRRKAKKEYRRNSPQKSIFSNSSELGRI AAWLADDIKRFMPAELRKNWKGYSQQLQQLSLAYFEKRPQEAFLLLK EGWDTSDGSSYWNIVVINSFSETEDFEKFYENYLRKRAKYFSELAGNI KQHTHNAKFLRKFIKQMPADLPKRHYILKDLETEKNKVLSKPLVFSR GLFDSNPTFIKGVKVTENPELFAEXXNGIATGTRNIPSSISMAGKETI MSF
31	Cas13	MEQNKLKGIDYNPFKTVDKHYFGGFFNLADNNIQEVFDEINIRYKN GNLKPVAIERYTTENTSLEVEYEFVAILTEYFPIVKEIDQKNKKDSNDK VIEKTIERITDFRDAFILFIETIEKLSYYTHYQHDDITIDNQLFIHLDKILL NTVLETKKKYKTDKTKELLKNSLQAEKELYHLKINQLEQKKNEVDALI KEQKSKGKTKDKPFKYSKDRDQIINSIYNDAIRPFLYENANKVELSDKKK TAFNEKDASASERDFNLPISSSGIIFLLSCFLNRKEIEDLKANIKGYKGKVI KGETFDLEKNSIRFMATHRIYSVMCYKGLKNKIRTSESATKETLLMQMI DELSKIPDIVYKNISTDLQNTFTEDWNEYKDNIEENNENLENSKVIHPVI RKRYEDKFNYFAIRFLDEFVDFPSLRFQVHLGNYIKHSMPKNIGSVTTT REIKNKIFVFGKLNEINQSKNDFFNKNKEEEQETNWEIFPNPNYHFBM ENSDELKNANKIGIYIDLKDKRKKDTLNEAIKKREKETSIIYKKDLVHQIID KNLDMHIGQPVAYLSMNDIHAIIFSILSQNVFTKDNKLNGGDIEKKIKD QINNQITEITEKDASIKILKNHSDNNSNYPNTHKLYDDISNEIEXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXNEIEVLDKLMQKHEKRVKEY INTQEDKKYPARKHILYNSEKGEIATWLANDIKRFFPKEFKENWKGH YHSEFQRNLAYYETNKKEVKITLNDLDYRKEIPFIDFSKNTLADFYFEYLK KRKIYHKNLWVEVNKLIKGENINKEKLFDCNCFRIYKRKNYVSNVIDEKV NTILSNPIFIERGFIDEKPTIIPKMPLEGNEEHFAAWFVAFKSFKNNEFQ NFYDTNKYPLETKDKTNSSELKKIQTKTYNQKKNDWATWLIVQYIFKDIF STDLQNVKLSELFQTRQRIQNQVKALDGERNQNFIVNRTIDLQLNE KIKIPNVKLKDIGNFRKYVNDNRVEAFLRYNDITQWMAYLPSNWQKE DESKPKPVNVIQLQLDDYEKIRREELLKEVQKLEKTIYNNNTNVKTVLLQ DGNPNFKNYVLNGLLEEIKGINISAFVTLHEKTNFDKIDFNVLENCSEIE

		QSATLIILIRNKFAHNQLPSSDCYQFCSKILTRDTEQTYANYYLKLFMILK DKL
32	Cas13	MEETTTMGKGVAYDHTLFKDKHYFAGYLNLA VNNIENVFKTVYKNRF DIKQHNLYKILDSLDGQISEPDYIERVSFLKQYFPVLHYLDLHPDNKRFT KEEDKVKARRRYLINNLRLLIETLSKLRDFYTHYYHKPLSIEQNTFSLIDNI FLNVVIDVKRQKKKNDHTRQLLKDSLKEEMDILYQKTKASLKEQKEN TRIKLDSETINNTIFNNSFSHLIYRRKKADNDILSASCKSEYKGEPTENGI NVSVDGLLFFLGIFLSRKESNDLRGRIKGFKGTVIKDLPDFPNEKNNSLK FMATHWVFTYLNKPIKQKLNTNFSRETLLQIVDELTKIPNEIYRNLCF KKQQEFVEDINEYIKEGDDIDTNSSTVIHPVIRKRYENKFNYFVLRYPD EFVSFNSLRFQIYLGNYVHHIQRKKLSGTEYETERVIKEINVFGLSEVS NIKGDYFIQNNPDNEALGWEIYPNPSYNFTGNNIPIYFINDQDKEKIN EYKSIRNFSEKRILRKKKNKKKQEIFDLINNTLTTRVFTAEP TAILSLNELP ALLYTILCENKTASEIENLLRRTYLKRLNTIKNYQPGTLPQSKITKNLKS TNQESLDVSKLIKAMKHEISNEKLTLIKKNQNEVKDTS SHRRKYVFNSK ELGIEATWLANDLKRFPKPKVRENWKGVMHSQLQNSIAYYSQKPKE ALSILSSVWNFNDDNYIWN EGIKKA FNEKEFEKFYCKYLASRNKTLEKL KENLDNLEYKTDKRKLDKFIKQQLNDCLFHIRT YIDSTQE QINKLLAKP LVFPRGIFDSKPTFVKNESVTEKPELFADWYTYTYKEHPLQEFYSFTKDY ECNFKKEKLTVKEFVKNQEQNLNPEEQNLNFKLKEDLSIKCIKNQDLFLKL VVDNIYNKIFEYNIDISLKNLYISRKERIAIGLKAKELNQINDSYIWGKTIL YQDKQIRETKVQLKDINKIKRFEEDKVKQILSYDINKQWEIEELKYELYI KPNSYEVIRREKLFKAIQEFESYILTINNFDGSNHPSILEYNSNPRFKHYV VNGLLKKGLATNEEIEWLLAKGQKEFN TFDKSIVEKPEIIQKAFLLVLIR NKFAHSQLP IKEYYEMIRSYTKNIENLNTTEIIFQFTTNTINELKR
33	cas12b	MATRSFILKIEPNEEVKKGLWKTHEVLNHGIAYYMNILKIRQEAIYEH HEQDPKNPKKVS KAEIQ AELWDFVLKMQKCN SFTHEVDKDVVFNILR ELYEELVPSSVEKKGEANQLSNKFLYPLVDPNSQSGKGTASSGRKPRW YNLKIAGDPSWEEKKKWEEDKKKDPLAKILGKLA EYGLIPLFIPFTDSN EPIVKEIKWMEKSRNQSVRRLDKDMFIQALERFLSWESWNLKVKEEY EKVEKEHKTLEERIKEDIQAFKSLEQYEKERQEQLLRDTLNTNEYRLSKR GLRGWREIIQKWLKMDENEPSEKYLEVFKDYQRKHPREAGDYSVYEF LSKKENHFIWRNHPEYPYLYATFCEIDKKKKDAKQ QATFTLADPINHPL WVRFEERSGSNLNKYRILTEQLHTEKLKKKLT VQLDRLIYPTESGGWEE KGKVDIVLLPSRQFYNQIFLDIEEKGKHAFTYKDESIKFLKGT LGGARV QFDRDHLLRRYPHKVESGNVGRIYFNMTVNIEPTESPVSKSLKIHRDDF PKFVNFKPKELTEWIKDSKGKKLKS GIESLEIGLRVMSIDL GQRQAAAA SIFEVVDQKPDIEGKLFFPIKGT ELYAVHRASFNIKLPGETLVKSREVLRK AREDNLKLMNQKLNFLRNVLFHQQFEDITEREKRVT KWISRQENS DV PLVYQDELIQIRELMYPKYDWWAFLKQLH KRLEVEIGKEVKHWRKSL SDGRKGLYGISLKNIDEIDRTRKFLLRWSLRPTEPGEVRRLEPGQRFAID

		QLNHLNALKEDRLKKMANTIIMHALGYCYDVRKKKWQAKNPACQIIL FEDLSNYPYEERSRFENSKLMKWSRREIPRQVALQGEIYGLQVGEVG AQFSSRFHAKTGSPGIRCSVVTKEKLQDNRRFFKNLQREGRLTLDKIAVL KEGDLYPDKGGEKFISLSKDRKLVTTHADINAAQNLQKRFWTRTHGFY KVYCKAYQVDGQTVYIPESKDQKQKIIIEFGEGYFILKDGVEWGNAG KLKIKKGSSKQSSSELVDSILKDSFDLASELKGEKLMYRDPSPGNVFPS DKWMAAGVFFGKLERILISKLTNQYSISTIEDDSSKQSM
34	cas12b	MATAVDSTTRAYTLRLSGGNNWRELLWQTHVAVNRGAWVWGD WLLTLRGGLPASLADGDAERRVVLALSWSVESPASLAPQAHIVAYGS DARDERNRKVTERFRDILRRMGIKQQEQEWLDACLALMASIREDA VWVDRSACFAEAQQCYRGLSSEWARKTLFDLGGEDDYFKPSAKEG ASSKAKDFVQKAGRWLSRHWGAGKKSDPRDISTRLGKLAGVDPKAID GHTGRAALEDLLRTLGSRPAQNADAELKLYRQLKRAVGWKGPRPSKA VALKKIRDAERVPNDLWKEIASTLREEAAVQSSQTSDDAAVPDWRSH WPAEITGLPMPYRVDRDYIWEHGVMLDHALRRVSSAHTWIKRAEAE RRRFQQDAAKMGSIPEEARNWLDADRERRSSSSGATGDYLIRERAIN GWDKVVQAWETLGPSTRDQRIAAARDVQANLDEDEKFGDIQLFA GFGDEHVDDPERCLADDRATCVWRNSSGRADGRILKDYVAATVAEH NQRRFKVPAYRHPDPLRHPVFVDYGKSRWSINYSALTAAQRRKTTQ KLAQAKTDNTRAKLQQQLASTADLRSVTLGVWDGNRIVKISQRWRS KRFWRDLDLDFHGSHPAAVSRADRLGRVAARQDPGAAYVYAKVFE QQDWNGRLQVPRRELNLADVVYGGKADPDFGKLERLDPRARRLW ERLSWFLTTSATVQPQGPWLDYVAAGLPSGIQYTKSRAGYYLNYDAN HGRKGRARLCLARLPGLRVLSLDLGHRYAAACAVWQTLTIEQMTNEC RQAAHPAPSNDLFIHLRHPHHPKQKSGRKKGRPVTKTTIYRRIGPDK LPDGTDPAPWARLERQFLIKLQGEDRPARYASQKEIDEVNQFRNFV GLEPIVDRPRVDDLHSDAVRVARLGLRRLADAARIAFAMTAACKPISG GHEVELTTAQRIEFLQDALLWQSLAASRRYRDDWAELWQSWVVE KLGGPQPAEIADDLPRSQAASLKTARQSLRKVAEKLSDGQSPSAAEL HRLWAERWQQRQTEWRRHLRWLRLILPRRKDHQQEDRPLQRVG GLSVKRIQTIRQLYQVLKAFMRPEPSDLRKNIPAGDRSLASFGRIL NHLERLREQRIQLASRVVEAALGAGRISKPPGRDRRRPQQPVDRPC HAVVIENLQHYKPEDSRLRRENRLMDWQARNLRKYIVEGCELHGLL FVEVSPAYTSRQDSRTGAPGLRCEDVSRTALQEAARRMHASHSRPSN SSPGGSQTQFEREVCRWINEFKRVEGSSSSLSARQAVLKAFLHHQASI PTSLSTILLPRRGELFVSADPDSPLACGLQADLNAAANIGLKALTDPD WMGAWWFVLVDRASGQPVVEQVQGCPIWLSCGPLSNSNPATIDPS DSPTAARRSNGTGAKGRARANNEYWSSLSATLTPDHKAWQPTQDY WRDIEQRVVKRLRLLDGSEWSED
35	cas12b	MNRIYQGRVSKIEIKDSEGNFRNVPVGSPTCPLWRHHRIFQDAVNY YLVALGALAGTGSENAFVGLGSKDRVIHDLYSRLFDSWERFPRDMHG

		ASSLRDSLRRTLPLGLSERASLQDAFDAILSGNEANARERVLSLLSLIQDL GGDIQKGSKRYFPFFCEPATKATFPRARVGLLKVEGKDFVPRLLWSSD LEIAPDQVVEQLKFEYFANPNESVQPIEGNEARVRLIEALDNPQLGIEL PIEILSDLRKRVHLIETDIRIPRYFFGGAGAE LRKFRLDLFLIAAYVTPDPSI LRALRNSFKEPSASKSSKKKDETEEEVENLLRSLGDDPLILARGERGFVFP SFTSLPTWVGANAQKPIWRDFDIAAF AEAL KSLNQFTAKTEEREKELK KAEETLHYMLGISDAIPRSSDSETEEQAPSRPGKDP RWPLVAQLEKEL GENLSEGTWQLSRSAMRGLRDIIGLWRKHPGASVVTLOKDVKTYQA DEKHKREIGSVQLFLLCEERYHALWQTETDDERGDSEENDDPARILS DAIEVHQIRREVERFREPIRLTPAEPVFSRRLFMFSDLTDLAKVKFGET TEENSEVKSQFVEAAIALKEGENLKEARVRITFSAPRLHRDELLGGAESR WLQPITAALGFSNPAPSVKFDSAVALMPDHMDGRIRHLLNFPVNF DSAWLHQSIGKADLWKSQFNQTKDKNLHLHWAGTARDTTRKNTW WENRTIIENGFTVLSNDLGQRSAGAWALLKVTC SRPDTKHPVRSIGH DGTREWFATVLTATGIHRLPGEDQRILKNGKWATEQSGKKGRNATFSE YEAACVLAKNLGCESVENWLGMSGEKSYPALNDQLVKIANRRITRLGT YHRWSCFSPEKFEDPARRANVIGGQLAELSAYQDENVTVSADILKSGD FEGFRHRAGAAFEALRTELEVHLVNLANLTAPLRQKVWSWQKRPDSS GYGDLLMVDLDDCHPKIRGQRGLSMARLEQLEGLRRLFLRYNRS LDR SPGIPAKFGREDVGR TSGEPCQALLVKIDRMKEQ RVNQTAHLILAQAL GVR LCPHRIEENERKSRDLHGEYEKIPGREPVDFIVIEDLSRYLSSQGRA PSENSRLMKWAHRAVRDKLKM LAEEPFGIPVVETVPAYSSRFHALNG QAGSRLHELHELEAYQQQSLINLAAKTD FQNRDRSKAAGELFEQFQA LAKLNERRRAEGKKVPRTLYPKSGGPLFLASRDGDTIHADVNAAINL GLRAIAAPACIDIHRRLRATKEKEVYRPRVGNAREKSASF SKDDIIQPSGA PSKKFASSSSPNFFYEPEDLKQANGEPLFDRAMFGEYSLVSGVSLWSM VNNAIYIRCVELNRTRLHGKDPDDQIPM
36	cas12b	MSITRSIKVKLIVPRDASLEARQLREGLWATHLFVNDGCHYERL LLEF RQRDVCVGKDDAGKDVIVPAAEWADRLRARLGRNGMVPSHIEAALP IFRELYENMVPSALKAKSGTGQAGRSWHSKLVSPTSRGGEASAARIDV LRPLL PVSGDDPAFEP AARALIEEAGDELLTSTGRCPAWVTAYRKGPE GSAWVEKLRIQLREAVEAGDFDPPSDPQILAAGAVPAAPPLGAGIDAL RPLLPLGGDPAFEP AARALVEDIGDELFTSTGRPPTWVTAHPTWVRA HRKDAECLEAADD FKWVERLRQLRDDAKAGKFEQPLHERLGALGAL PVAKPIGAGRVVSRADLT VFERGAMELAIEHLIGWESAGHRARAQYV ERKKRHDDLLQWIEAEAPDALLAVRAYEAARTIHLATLGELGAAPQYT LRLREIRPWRKLREWLLQNP DATIDERRRRLATMQTNDPRGYGGEAL AWLAAPERRALVEHPAGDVVTRIAVLNIRKSILDRSRLFPTCTLADPVE HPRFAKFGKPGDKNSAGYALAVDGVRR EAIKILVPRQDGLLVPTDLR VPFAPSGQMRDLRASGLDISYERQDGRGRQA AKLQGGNLMFDRTHF ARCGAPGPEALGSVWIKVALDLSSPAASLAMKTATPVRTYLSTAVRGR PESTKYEKAAPPEGFRVLSVHMGLRTAATASMLRFGAPEEGGHEVPV

		SGLAGETLVAFHERVTMMLPGEDPDTRTEANRGVAKRELRLGRGI GCLKAIRRASASATPEDRAEALVIIETHVGGDRHGWAPAEAVGRLD PHGDPDDWKTACAALYAAVEADLGVAISSWRKAARAGGATGMLGG KSLWAVDHLERSFRFLRSWDLRARPHDGDPRRPRPGYASKLLHHIDG VKDDRVTADTRIVQAACGRAWIGGPTVKRGTDQDVRLPGRWEQRG PRADLILLPDLTHFRFRSDRPRAENSRLMRWAHRQLAIYVRMQAEVE GILVADTGAAFTTRFDAWTGAPGVRCEPVTADHLRGIKREDYWLAR LLREGALKHLRIDPASLRVDDLVPMDHGKILVALDGVLDPLGLRILDTDV NASQGLGRRYIEGHGLAYRLPGARVPRGEGEREAAVVIHKGKRLASA MGGTVVVLRASEGPGDITWTAEVYDRPQGARKALGLSLAAFNISIATA AVDDEGPAPENDDEALEEEAEALGIATGERIVFFRDPGAVAGGGW LEASAFWGIANRMVTDRLRELRLG
37	cas12b	MSLNRIYQGRVAAVETGTALAKGNVEWMPAAGGDEVWQHHELF QAAINYLVALLALADKNNPVLGPLISQMDNPQSPYHVWGSFRRQG RQRTGLSQAVAPYITPGNNAPTLDDEVFRSILAGNPTRATLDAALMQL LKACDGAGAIQQEGRSYWPKFCDDPDSTANFAGDPAMLRREQHRLLL PQVLHDPATHDSPAIGSFDITYSIATPDTRTPQLTGPKARARLEQAITL WRVRLPESAADFRLASSLKIPDDDSRLNLQGYVGSSAKGEVQARLF ALLFRHLERSSTLGLRSATPPPKNAETPPPAGVPLPAASAADPVRIA RGKRSFVFRAFTSLPCWHGGDNIHPTWKSFDIAAFKYALTVINQIEKT KERQKECAELETDFDYMHGRLAKIPVKYTTGEAEPPILANDLRIPLRE LLQNIKVDALTLDGEAVSYGLQRRITIRGFRELRIWRGHAPAGTVFSSE LKEKLAGELRQFQTDNSTTIGSVQLFNELIQNPKYWPIWQAPDVETAR QWADAGFADDPLAALVQAEELQEDIDALKAPVKLTPADPEYSRRQYD FNAVSKFGAGRSANRHEPGQTERGHNTFTTEIAARNAADGNRWRA THVRIHYSAPRLLRDGLRRPDTDGNEALEAVPWLQPMMEALAPLPTL PQDLTGMPVFLMPDVTLSGERRILLNPVTLPEAALVEQLGNAGRWWQ NQFFGSREDPFALRWPADGAVKTAKGKTHIPWHQDRDHFTVLGVDL GTRDAGALALLNVTAKPAKPVHRIIGEADGRTWYASLADARMIRLP GEDARLFVRGKLVQEPYGERGRNASLLEWEDARNIILRLGQNPDELLG ADPRRHSYPEINDKLLVALRRAQARLARLQNRSWRLDLAESDKALDE IHAERAGEKPSPLPLARDDAIKSTDEALLSQRDIIRRSFVQIANLILPLR GRRWEWRPHVEVPDCHILAQSDPGTDDTKRLVAGQRGISHERIEQIE ELRRRCQSLNRALRHKPGERPVLGRPAGGEEIADPCPALLEKINRLRDQ RVDQTAHAILAAALGVRLRAPSKDRAERRHRDIHGEYERFRAPADFVV IENLSRYLSSQDRASENTRLMQWCHRQIVQKLRQLCETYGIPVLAVP AAYSSRFSSRDGSAGFRAVHLTPDHRHRMPWSRILARLKAHEEDGKR LEKTVLDEARAVRGLFDRLDRFNAGHVPKGPWRTLLAPLPGGPVFP LGDATPMQADLNAAINIALRGIAAPDRHDIHHLRAENKKRILSLRLGT QREKARWPGGAPAVTLSTPNNGASPEDSDALPERVSNLFVDIAGVAN

		FERVTIEGVSQKFATGRGLWASVKQRAWNRVARLNETVTDNNRNEE EDDIPM
38	cas12b	MPTRTINLKLQISPKTDEGRKIRSALWTHSEINKAVAEIEKLLLLCRGE KYYTTNSKDEEVEVPEPQVKTDALEMARAVQAKNGKAGTGSDEEVLS ALRMLYEATVPSSVLDDKGKPLSGDAQSIGGSYAGPICDPETCRIKDV DRLFESGPFAETASKKFTQLPAWFNEVTKKNFNKDEPEKFVKVGKDK DEKFYEIDLRQADAWYESPEVKDIVSKNKA FNKDKWWKNKRDGVD WAAEFVKKQFDLRKDVRSIREELWDRLLPLGSLYFKKPVGNKWN RMAFRLAIAHLLSWESWNHQTAEYTKYTKYKDGIELAGASRSLEVR FEPLRQYQKERHEELSRTSFVDDDRPFTIGARMIRAWGRVREAWRNK GDGIDERRQILADLQTELKGFDPHLFLWLAEAGRESLWRDEDVLT FVEINIAQRDLERHPYSLMTFADARLHPRWAMYALGGTNLRNYEL TPEGKVKIPLLICEKDKLSEKFTIPLAPSGQLKSLEIKSLPKKKVKISYASA HQFYAGIPGGSEILFDRLFMENRASSALANGSCGPAWLKLTVDVESKA PPEWLDKKGRVQTPPTVHHFKTGLANKSKHTDKLEPSLRVLSVDLGLR TFASCSVFELVDEKPAKGLFFETDHPHLWAKHERSFKLTLPGEEAGDD PKVAQARREAMDEVYSLRRDMYRLKDILRLKIISAPNERREKLESKIAE MREKQDARAVVTSNFFERLSEKCDLNPPMWEHSCNEIHRDAEKAFS ARIGEWKRTRKRPGSWEEWRETRSYHGGKSYWMIEYLEAVRKLIG WSTHGRDYGEINRQNKRYGTVASKLLKHINKLKEDRTKAGTDLIQA ARGYIPLPGKGWMEKYRPCRVLFDLARYRFKVDPRPRENSQLMKW GHREIINEATLQGEIYGMVVETAGAGFSSRFHAKTGAPGVRCRYLKED DFENGAPKEFLVRQMKNLMMKGRLEPGLLPWDGGELFATVDNGK PIVIHADINAAQNLRFRWTRFADAYRVNAVEENDNWVVTDTGVRV LGALEMAVHGEADRKPRTGFTLHGTQSGAELKAEGKKTDIKDVVED KDDSISEIIEHQDEKERKGRETFFRDPSSGILDPGKWWYGSKRFWGRAK GAVTEALLDNQGANNALEEKPGNDELFP
39	cas12b	MATRSFILKIEPNEEVKKGLWKTHEVLNHGIAYYMNILKLIRQEAIYEH HEQDPKNPKKVSKEIQELWDFVLKMQKCNSTHEVDKDEVFNILR ELYEELVPSSVEKKGEANQLSNKFLYPLVDPNSQSGKGTASSGRKPRW YNLKIAGDPSWEEKKKWEEDKKKDPLAKILGKLAEYGLIPLFIPYDSN EPIVKEIKWMEKSRNQSVRRDKDMFIQALERFLSWESWNLKVKEEY EKVEKEYKTLEERIKEDIQALKALEQYEKERQEQLLRDTLNTNEYRLSKR GLRGWREIIQKWLKMDENEPSEKYLEVFKDYQRKHPREAGDYSVYEF LSKKENHFIWRNHPEYPYLYATFCEIDKKKKDAKQATFTLADPINHPL WVRFEERSGSNLNKYRILTEQLHTEKLKKKLTVQLDRLIYPTESGGWEE KGKVDIVLLPSRQFYNQIFLDIEEKGKHAFTYKDESIKFLKGTGGARV QFDRDHLRRYPHKVESGNVGRIYFNMTVNIEPTESPVSKLKIHRDDF PKVVNFKPKELTEWIKDSKGKKLKSIESLEIGLRVMSIDLGQRQAAAA SIFEVVDQKPDIEGKLFPIKGTELYAVHRASFNIKLPGETLVKSREVLK AREDNLKLMNQKLNFLRNVLFHQFEDITEREKRVTKWISRQENSDV

		PLVYQDELIQIRELMYPKYDWVAFKQLHHRLEVEIGKEVKHWRKSL SDGRKGLYGISLKNIDEIDRTRKFLLRWSLRPTEPGEVRRLEPGQRFAID QLNHLNALKEDRLKKMANTIIMHALGYCYDVRKKKWQAKNPACQIIL FEDLSNYPYEERSRFENSKLMKWSRREIPRQVALQGEIYGLQVGEVG AQFSSRFHAKTGSPGIRCSVVTKEKLQDNRRFFKNLQREGRLTLDKIAVL KEGDLYPDKGGEKFISLSKDRKCVTTHADINAAQNLOKRFWTRTHGFY KVYCKAYQVDGQTVYIPESKDQKQKIIIEFGEGYFILKDGVEWVWVAG KLKIKKGSSKQSSSELVDSILKDSFDLASELKGEKLMYRDPGSGNVFPS DKWMAAGVFFGKLERILISLKTNQYSISTIEDDSSKQSM
40	cas12b	MYRGFCTVTATSGGWQSTTFLAGAQMADTTTTRAYTLKLQGDRLAL WRNHVIFNNGVKAWEWLLCLRGGLPASLADHRDSLDSKGEISRTF KERTAATPATIRQELKFAATEKKVREEVASRRKKVTETAVAKELLAAR RSELRRILALSWLCPETPVQLVPQAAIVAAADDSDREQKVLDFGRQILK RKGVSVDVAGWVQDCDATLRATIRSDAVWVDRACFCSPRAVRPS EVDAAKHLFRLFGMSDYFATASASSGPAEPKDFANTCRDWVSSFW GGGEKSNKASILAALSAIAQIKPTRVVGKRGPAALAVIAGVLEQKPVDD SVEALARAIGWLSGRPSAARLAINAIAASPRVSQKLWDRLVLACEKDC GRQKSKLAFEGSASTIASALEPRLAGLTGMPYASTGRELIGEYATMLAF AMRRVSQIHTKAKQAEAEERSFAPEQARLALVPSAARKWLEDYVEAR TAASGAVDGYQLRKRALGGWADVVAAWSRCETSEDRIAARVRELQAD WEKAGDVQLFEALAADDAICVWQSANGKTAASILTQYVRAAVADQN ATRFKVPAYRHPDPLRSPTFVGFGNSQWSIAYSAQGEARERRKLLDRA SGSAKDAERAREGLAREAVLQNVSLDLWAGDKMVPTQFRWQSRRL SDLALHSVPAMKGAKVTRATRFGRARIAAGPVLLDGIADDTWNGRL QAPRRQLEDLARILDAKGLPFDDDESKWPPKVRSLKHLGWFLTHSAKL TSPGPWLDYVAGGLANGWKWAEAREGACLFREDNDRKGRKAKLILS RLPGLRLLSVDLGLRTSAAAAVWQVVSQRQLTAAKDGAHSVSDTDLF CLVRTGDRTQVYRRIGLSAWARLERQFLIRLDGEKAAARPATTNEWES LQSFRAWLGCGIERRPEKLPPVDSLQQAERLCRLGLRRLSDLARVAYL LTAKERPIMGGRTAPLDEEGTVQAAQDALSILHALGSSEDFSDARLQG IWRTAIGDTPPLAARLTKKQRQELREALRPAAEKLKGKAALGKELADL WKERSAAWAKHLRWLRDWVIPRFDKRNKGERVRSARGVGGSLDRI ATIRGVYQIMRAYASRAEPTNLRAGVERLEKAAAKLRPEFGRRMLAK MERLREN RVKQIASRIVEAALGVGSEDRLHWRGRRRPTAAISDPFA PCHAVVIENLENYRPDEKTRRENRLMSWAARAVGKYLAEGCQLH GLYLRLQVSPAYTSRQDSRTGCPGLRCNDVRAQELLNPEGWIGRLVAR AAQAVKEGKATPRQRLVTLAESARAGIAESAARVRIAPGGQLFIAADP QSPASNGIHADMNAAANIGLVALLDPDWPAAWWRLPCKAATGYVD ESKVGGSEAVPLGRAILEVGAEAGKVYVNAWSDPQDSAVSRREWTD TKRYWRDVEERVVEILLASNRGGRRGKPGAVPF

41	cas12b	MATKSFEAKIVCKPDEKYTAEQKKQFLWFTHQVFNDGVRKVIPYVFK MKRGELGPEFQAIYYAITSSQDAIGKLEAVINPDWTSKGIGKSDPNKW KELLYQELEKGFRQRLKEEGIKSTKKFRKELEDEKKKLAKIIGQKDIWA DAAAILRNKNLLLFNRDELLPNLPSEFRRKIYEMTIQLIHGHQELVANW EDEHAEWLIEKDKWEEEHPEYMNVRPIFEKFEKEQGKVKGSRRWLA YLDFLSSKPELANWRGKAKETIPLTKEERAGFRKPGQHFAAFFNKNPEL QELDRHKEYQEKFARTQSKRTPHPDGFKHRPTFTLPDAMRHPVWYS FKGATDPTKGSTYRNLDLENCTLDLKVLTAMEGEGRNPGGMIQYAFE PDERIKGFRYVGTTEKGKRAKGYIYYDPILEKERPAKIQGKLVFRPPRP DGTAYLIFSCQIEDEKPKIKIWKDKEEESPEITKRKKTEVYPPELITLAI FGQRHLGAITCKNNNGRPEPIRFIPAYPKRRKDRESKPVS AWLAKIPG LTFNAVGMHEKEISAGMSRRFQDPKSIRQAGEKEGRKSKGQHIPETET PWAHLREHIANMKEDHYKKAANLIIRTALQNGAQVILIENLRNRPML ERTNLENRRRMQWAVRQTAKFLED TARPLGLIVRQVSSAYTSRFCSSC GHPGARVSLPGQKNWEKFYAEKYGKERKMI AVAGGQFFCCPACKKII NADINASLNMHKVFYQNF IWPGKIDKKDTKNFIWQGKNYNWDQIA DDVQSFLDQKAGIKKEDDIPY
42	cas12b	MAYGSEAPDERNRKVTFRILSRMGINQQQEQEWLDACRPALTAS IREDAVWIDRSACFAEAQQHYPLSSEWARETLFDLGGENDYFALP DPEAAPSEAKDFVQKAGGWLSRHWGAGKKS DSTAISTNLNRLAGV ESKAIVGRCGDALAVLLTTLGGWPAKNADSGTLYHQLKQAVGWKG RPSRAAKALEKVRDAPEVTDALWRQTADTLRQEAVAQSSRAAGGSG VPAWMPAWREDMEARLGMPYRGARDYIWEHSVMLDHALRRVSSA HTWIKRAEAKRRRFQQDADKIGSIPAKAREWLDAFRERRFSASGALR GYLIRERAIDGWDRVQAWASLGNCTREQRIAAARDVQANLDEDE KFGDIQLFAGVGDEDEGDPQCLADDDAICVWRDLN GRADSNILKDY VAATVAKHDQQRFKVPAYRHPDPLRHPVYVDYGNSRWSIEYSALKAA HQRRTTEKLVAKTDRARAKFQQPADTPDLRGVTLGVWTGSSIEK VSLHWHGKRFWKDLDLHFGRDPSATVSRADRLGRVAASQHP EAA VHVAKVFEQQDWNGLQVPRHELQRLADLVYGKGGDPDFAKLGSL DERRTRRQWEHLSWFLTTSTTIQPRGPWLDYVAQGLPQGIQYKKGR NGYYLEYAANQGRKRRARLCLARLPGLRVLSLDLGDYAAACAVWET LTREQITQECHQAGHPGPSQDDLFIHLRHRTGKPKQSGRNKGKPVTK TTIYRRIGPDLLPDGTPHPAPWARLQRQFLIRLQGEDRPARFASQHEID GSNRFREFLGLPLADRPRVDDLHRDMVRLARLGLRRLADAARIAFA MTATKKPISGGREETLATEQRIEFLQDALVRWQALAASSRYRDDWAR QAWQEWIVEKLGGPQPAEIADELPRSQQATRVETARRSLREVAAKLS NPQSSSATELHGLWAARWQERQTKWRQYLRWLRLILPRRKDYQQ ANRQVHRVGGLSVKRLQTIQYQVLKAFMRPEPSDLRKNIPAGD PSLASFGRRILHHRERLRQRIKQLASRLVEAALGAGRISKRLGRDRRR PRQSDAPCHAVVIENLERYKPEDSRLRRENRLMNWQARNLRKYIV EGCELHGLLFVEVWPAYTSRQDTRTGAPGVRCEVPRSVLEEATRRIR

		ALGSAPSGSSRGRSETRFEREVCRWIHEFNRVVGSSSGLSPRQSVLKAF LDHQAAIPTWRSTVRLPRRGGELFVSADANSPLANGLQADLNAAANI GLKALTDPDWMGAWWFVLVKRDSGQVPVQQVQGSPIWESCTRLSS PATVDSSDSPAGARRSKGRGARGRARATEYRWSPLSAMTMPDNKT WWPTRDYWPEIERQIADRLLREQIDPENRF
43	cas12c	MKKTSPKRSALRTARRQIARGCLPIGNRDISTTRTRVLPLADSVADAV WNQARTAAALTRGFGSGSLFDLLDLHASGLRFLSSNGEREGFLLKQK FDAGKFDRAAAKDVGEDMPKFTAANLRAALVAIPRGGGPDDAKAL ATRLARAVGVKATKLDKPPKLLKDMAKELAMAFPTWKELSTANGEV GAVIDDVARMYGLRWPSLRRGWAFRLPEVTRELGSPTLAFDPDAPVI DETSATARFAAIVARYLPECGLTDSAAAKGVQARITTTNANGLSWLF GVGLRGMRDLPVDTVADTLAIDVTRGRDALRALVNDIKALPRLGEFG DRVYVESRATLQGAVDSLIANYVGRDLVASADALEHDQPRPPVLD DADWKPAIFDGMGFTPWEVEDMLDARPVEVARLRLALGVLAGTTPA VAGDFARALADVEAFGAWAARTEAVAALINARVKVLKAPESLRLRGV LGGGRWKAVVSIHPDEGEPAQVIPQLDTQLQALLDDGQRAFDVLVA DYTPTFAAALEHARSMDRASLADKGREAPSAESIDLLARRKLLDMVAR VTRRGSPSLGHAFLAACAVQGLTRPGTATERSLRGHILSGEQALFVHP YARARSIVRLEHAGLLRLDLALLTAMERDAEQRADVREQIVLRFTRO SLLGGLPGRIRLAKVPWTQEAAAASGVRGAPWLKLHPDDAGTVARS EVIKAFTARFHLNGLLYRLNMRFLERYDIRCFIGDTLLFAPKAGAW TPPEQYRHGKYAHWLSHPDLPRTEGGAVDVVPAARWLTEASRRADE DGRASAVALLAQFPHEWVAACEFEGAPVYEGVFCEGKIGGWMKRR GYRLAPPRHFAGELLAFAFKDASVSPHGLTFEREMLEGTTVRELSRRV VAAYPIAVPHTPDARWPSPHLMLGLDLGEAGLVCLRHIGTGAETTL LLPVRKTRLLAHREEHYRRKVQPRQAFRKGYGDAVELAVKAAIGVC GIIDNLIVRYRAVPVFESAVAQARGSNKMIQRFVAGVVQHYTFVANN GAAQTVRQSHWFGAGRWSYTYGADLLPAARQMTEKQLLKAKAEAV FRPAMGFPGVMASGYRTSLVCACCGEDVLDVDAVAAAEGGQVALTT DAEGSGVLDLGGRLRIKLEAPSPNPIVQKAARRKRRRTPWEALADRT WTLTHKTDRAVLATLRRGLRRPPASVQGHATSGWEFHCAACGHIA QADVNAATNLVRRYDDRVRKMEQARAHWDDPSVRAKLASELAERA AARS
44	cas12c	MLTTKFKLELPAGCPLREDAATFDECRKLYDVVEGCGNGTLTGFLFSVI LSGFRIFPDGKTAEIFANRSVYDEDEFRSALVEAVGAPLPRFTVKALIKR LQMEVRARGNKDNRFVAEVMKKEYRQTLGKTLPGKVDESIVDRLF EEMARELTSRYRSWNELKGDLLGACKAVDAALRGFGDFPSLATMVTR AAARRLPKDSTIVFDPQSPCIDVQTIGVDAMPYAAVSTILSYPEVGEK RRDFVQNHLLTPSAAGLSWLFNRGLELFSEESVEELCRLFHVPEDQRT RIVQIQNAARATPRQSFFLKGGAPLGYHDFRSAGFRINSWTANYL NRLEELQGLLDLTDLRLPDLVRNGEDFLATTDCCREEVEILCRSFSRE

		RDRAQTAVEHLIGADPLQVSDVAAIEEYSRIVNRLCAIKEQIVNSLRQ AEDDKASRWTALWSEVKDEFQPWELIRLPKLNMGMSGGVPPAQDEL ETILARYSDVGRGASEHFDVMEWAAKTGAEGDVLKKFAETEQQRA DQRAPGKYDGRELALRLVLQVARVVRDRSDACAENVRQWFLKENV FAERKDFNKFFFNRLGNLYVSPFSNRRHAGYKLSDLVERS GAVWREL LALVKEMRGAYASFSEAGETFLRLESLLMGMRIGALTKNIPAEVAALRL DDETALESVSEGLKLQLQQA EVPPSVLAKAFNVVYVLLSGCLIALRRERF FLRTKFSFVGNTALVYVPKEKSWPMPSRYEASPSWTPIFENDVLVRLS TGEVEVAETFRRVALWGRTTDPVLKKALRELFHQLPHDWCCQVSVR SSGDMTPAKRKEDDRDVLIVEKKGKYDSTIISKIAATALVRLVGPSTH KERLNRLLLDVGEVACDMTLLADQEILQKVEDDRVHLSPGKLQFSLSV PISTPAEQCEDEVKSERKSTHFRRIVAIDQGERGF AFAVFRLEDAGKKG AQPIAQGFVNIPSIRRLIARVHSYRK GKQSVQKFSQRFDSTMTLRENV AGDVCGAIAGLMSRYRAFVLERQVSNLASGGKQLELVYKVMVNARFL DDRIPMHSLERTSWWCGTSDWVIPDLWVEVPESYAVKAKKDEILEKD GKFYRTLRLTPGAGVNAKWTSRICSQCGGNAMELIEKAREEKVKT VTL DANGEVTLFGRTLRLYKRPSEERSREARRRNERAPWTEPRADVRLSLD DFRRAVAENMRRQPKSLQSRDTSQSRYFCVFTDCRCHNKEQHADIN AAVNIGRRFLESLLRE
45	cas12c	MRRQHGGQNARDWRRKVAAAALRQKESVFTYKFGLSVNDGDFDF DAAARTYDITEGIERGSLIGLCAVHLSGFRLFSKVAETRQFLNRSRYPE NEFAQALAAHTEIENPSVTVQSIESVFVTPPRKQDGVARLWSADELAK RLFQTNWNNRSPREGERNHPELLAQGIARAVTKAFSGWKELADNAV HALTCADNYLATLGNRFKLSDLPLTAGSTQTGT LAFDPESPFLNMT GNEDIWLHQVAVCAGRLKRYMPEIDPSSRK FASRLTDSIVSSQNNGL SWLFGNGLRFLRQSSIAQIAETLSVSQNEHRRVEQLKEFADAIPVNPFF ATDGYAEFRGSVGGKISSWVS NYWKRICELTVLHSQPPDITIPEGLLAS ENATLFSGQHTAAAGLVALSARLPSQVRDAGKALFVLSGDGVPRADD IATVEDVAGELAELTGQLAMLDNRIQQEIERAQDANDEGRVGSLASL RPNPTKELKEPPKLNRISSGTADAAGELARLETSLNDLIRARREHFYRLA EWTGNTASLDPLPALAERERKALTD RGMDPTLAEAD EYALRLLHRIA GMARRLSPNEAKRVRETMTPLFLKKREANLYFHN RAGALYRHPFSNS RHQPYSIDLNRARATDWLAWLEERAREMLGLLGSGAPANHEYLRDLL SIETFVFTRLSGLPAQVPGYLAKPKSDLTNIPLLAAQLDVDEVSRDVA LRAFNLFNSAINGLSFRAF RDSFIVRTKFLRLGHDEL FYVPKARAWKPP ADYRSAKGKISKGLALPAVKRNEAGSILPRETTQGLSRAKFPEGSHALLS QAPHDWVVELDLRHDKMPQLAGLPVKMNADGLKGWRARRRPTFR LAGPPSFKTWLD RALTSTAVKLG DYTLLDQSFKQSLRVEDGEVRLSAE PAGIKAEIAPVIDARFPFETAEALFDNIIGIDL GERRIGYAVFSLPALLK SGNPTRVKPTVVGSAIPA FRRLMAAVRRHRGSRQPNQKVSQTYSTA LQQFREN VVGDCNRI DTL CERYRAFVLESSVANFETGANQLKLIYG TVLRRYTFSNVD AHSARSAYWYSANRWQHPYLFVREWNKAQRTFT

		GS AKPLAIYPGVTHPAGTSQICHRCGRNALRALRNMPDRTIRVGKDG LIVLADSTIRLLERADYSRELKTFKRRKQRPLNMPVPEGARPRDQLE RVLRRNMRQQPQSEMSPDTTQARFTCVYTDGFEHGHADENAAVNI GRRFLERIDIEASSRT
46	cas12c	MTHAKKIPFPVLKRSTLRKARQRIAAGSITAGERPFNSTVTRVVPVKDP VSDQVWAVAREAAMTLRGFGQGS LFDMLIHLHADGFR LFP SGRERE AFFLKDLFDPTFDDGARRAFGDVMPGFTANSLREILGAPARKCGKVT SVEILLPRLSKGLGVKKS AAPPEVLSS LAAALCEAFPTWSLLTAVDGGV GKVIDDVLRT HGSRLPSLEKAWSTNLPEVPKGLGVPTLAFDDQAPAS EQTPTGRFAGVVARYLAETFASNPEATAGDASKAVQAKVTTPNGNAL SWLFAVGRRAMCSTTLD ELAIGLNITSPRGRHALSSLKERMALPALS VLGERAYPDSRATLQGTVD SLIANYVNRLFELSSSATSIAQTKLILPAAIQ GDTAVFDGMPFSAEDVGALFEQLPSEIAKLEHAVKVLVGKERTSTLGY QKAVDDVDEFGVWASSVDAVIGQINARLKT LERAQEPLGKLMGDGK LKRLVNIHEPEGPAVEIIPVLDQELQDVLTS CRTAFADLEARYPMTVAK AQRHAEAEVRNALELASRKEGGLSLASADVPALAKRKILEPIISARRSS PAMATAVLTECLRQKLIVKGTGSESLRGYVLSGEQVIYAHPLSRRRSI VRLDREGLQNFDALEFLDALQKDATQRTNVRESLIVEMARQSLLLSAL PDRIEIGAIWQTPSQNQHAPWANLRPVNGTVGRSETIKSFTAVFHS RISGLLYRLNRQKFMEKYDLRCFIGSTLLFSPKNADWAPPPQYRHGRF SALLARSDFPWEGAEGTHANAVRLAKFLIDETR NATDLQQAIAAKALL AQLPHDWVCCDFD GAPS YEGAFVSAGEVSAWAKRSGYLLTPPRHF AGAFLEGFKSTKISPHGLTFERMLERDGD SVIETGRRVTA AFPITQEVA PAAQPWKPRHLAGLDLGEAGLVCLKNLDNGHEQTLLKTRKTRLLA HSAEHYRRKDQPRQVFRKQYNQSS ENAIKAAIGEVCGLIDNLIARYDA VPVFESQAAAARGSNRMVARVYAGVLQRYTYVVGNGAADATRTSH WLGANRWSYSFGADVIPKVRDLSPEVLR SIKK PENVFRDALGFPGVLA NAWRTSMICSVCGTDPIGALEEAIAANQISFVTDNEGEGSLDLGDGRK VTLRVEVPTSSALT KREASRRRRAPWEAKVGT VWT LRKSHRDDLLT TIRRS LRPSSTFQGSTTKQWEFHCPCCGQIQQADVNAASNLVRRYF VRASDNARARQHWADDSKRLAFIASMGPDRSAREEKVS
47	cas12d	MRKKLFKGYILHNKRLVYTGKAAIRSIKYPLVAPNKTALNNLSEKIIYDYE HLFGPLNVASYARNSNRYSLVDFWIDSLRAGVIWQSKSTSLIDLISKLE GSKSPSEKIFEQIDFELKNKLDKEQFKDIILLNTGIRSSSNVRS LRGRFLKC FKEEFRDTEEVIA CVDKWSKDLIVEGKSILVSKQFLYWEEF GIKIFPHFK DNHDLPKLTF FVEPSLEFSPHLPLANCLERLKKF DISRESLLGLDNNFSA FSNYFNELFNLLSRGEIKKIVTAVLAVSKSWENEPELEKRLHFLSEKAKLL GYPKLTSSWADYRMIIGGKIKSWHSNYTEQLIKVREDLKKHQIALDKL QEDLKKVVDSSLREQIEAQREALLPLD TMLKEKDFSDDL ELYR FILSDF KSLLNGSYQRYIQTEEERKEDRDVT KKYK DLYSNLRNIPRFFGESKKEQF NKFINKSLPTIDVGLKILEDIRNALET VSVRKPPSITEEYVTKLEKLSRKY

		KINAFNSNRFKQITEQVLRKYNNGELPKISEVFYRYPRESHVAIRILPVKI SNPRKDISYLLDKYQISPDWKNSNPGEVVDLIEIYKLTGLWLLSCNKDFS MDFSSYDLKLFPEAASLIKNFSGSLSGYYLSKMIFNCITSEIKGMITLYTR DKFVVRYVTQMIGSNQKFPLLCLVGEKQTKNFSRNWGVLEEKGDLG EEKNQEKCLIFKDKTDFAKAKEVEIFKNNIWRIRTSKYQIQFLNRLFCKT KEWDLMLNLVLEPSLVLEEEWGVSWDKDKLLPLLKKEKSCEERLYYSL PLNLVPATDYKEQSAEIEQRNTYLGLDVGEFGVAYAVVRIVRDRIELLS WGFLKDPALRKIRERVQDMKKKQVMAVFSSSSTAVARVREMAIHSL RNQIHSLALAYKAKIYEISISNFETGGNRMMAKIYRSIKVSDVYRESGADT LVSEMIWGKKNKQMGNHISSYATSYCCNCARTPFELVIDNDKEYEK GGDEFIFNVGDEKKVRGFLQKSLGKTIKIGKEVLKSIKEYARPPIREVLL GEDVEQLLKRRGNSYIYRCPFCGYKTDADIQAALNIACRGYISDNKAD AVKEGERKLDYILEVRKLWEKNGAVLRSKFL
48	cas13a	MPIVKKFGRSQTSLSDRKIVLKMETAARNIPDFLLSDPEAVIGQWASA MDKIAKKPKGKDKPSSYQRKFRERLGKAIWADLTGPEGPLRDVPAEAL EDLRKRWDRRVHPYPDGTKDGPKPATPKGRLYTRFAGEVGYGKADA VAIARDIRIHLETEFKTGGGTRDAGRAVRASSIEKNVLKKARVPQRP KPPQEAAWSKEDEDRYFIPHDVARKIVLAAKAQEKEDHRVAWRTAA AVLFEHFGRIFQQDGRALSFAEAEKQMPGLLALHRAVEGYRQALKR HRKDRREHEARPGREKGTGRRKVSAILPKDKTALLALIGHQHQNREIA ALIRLGRILHYEAGRRGNSDMVANINRNWPADVSESHYWTSAGQIEI KRNEAFVRIWRSALSHANRTLGDWLSPPDEVANDITMSWESKHEKSG KRKTGKLEENREEAEAHAPVIFGGSERLGTGDDFQKTLAICEVFSQL RHSSFHFRGLDGFKDALTCTVKTCDPGAVARLQDLHAEDQANREARL KEDLRGAHAELFLDEGRLAIEWALLHPKSTKTLPLPRYSRVVTRAEN TCNGLKLPKSVNRESMKVPAIHCRYILTRLLYQSGFRTWIAEAPAAQLN RWIETATERAQKATVGITKNEADRARMVGGQIKVPEGQGIRFLDDLA GLTATEFRVQAGYESDREAARDQAAFLNLNCDVMALAFDKYLSCHK LGWLAGIDAESRPSETPLSNVDELPSSGSLGTPERWEAALYAVCHLIPV SEVGRLLHQLRRWSNGQKATPDGGRLERLFELYLDMHDAKFDGSTPL RDHDDLAVIFETTGIRDRVLPSSLQHGEHERLPLRGLREMLRFGNLRVL APIFATAKVDQAMIGELEGLEARIGDAPSQVDRAQALRTEMHAALCK KRKLAHDDKKSVDYLTSLQTVIRHRRLANHVRLTNHVRTNEILMSV MGRADFSGIWERDLYFVTNALLYQAGLTPCDVFSKEPPKENRRSPLO EFENGQIVFALRKMQAQCDTHAGLVDQIKGETARLFHIAEGAPGNP RIQNRNWFHAFNALKPKTGDRDLTADMNRARDLMAYDRKLKNAV VSAIVTLERENIVIAWTMKDHQLTDAVLAAKSIEHLKQNKIRENLRDE RSLGYVAALFGGRVAEEAPDIMHDRTVFHLVGALTEEMEPAE
49	cas13a	MRIVRPYGESRTDLGGERGQTRVLVDNTAARARHEIPDFAQSHDALV IAQWISVLDRIATKPQGTQGATRAQHAFRDRLGRAAWAQMCADRI SAAQADPYVAALWRFKTHPYGDAKYRPRKGKDGKPLGEPKPQGR

		WYGRFAANAEPEQADVAAIAALMDHHLHVAELRIDPKRPEKRKGLIE ARAKSIEGNVLVAEPRKRPVGSWSREAITRYFMRQDVAAEIFAAARD REQGLNDVPRGPVRLALAAKILHGHWTRLFHAPGTRTAYSIREAEEKE PELFALHMAVKDAYAKLLKRRTQPKTLKKGVKPPQQAQPVTTVLPKNA GELLRLVQHRSRNRDLSALIRRGKLIHYTAFDIAAAAAEAESKTPDVPD ADRLAYVLTHWPDDLSASRYLTSQGQSAIKRSEAFVRVWRHTIAMAS LTLRDWASMNNDLGDVLGSANKVDQAIGRANFDPAWHDKKVRLLF GARAALFPSDDDGKALLASVIRAGLALRNSSFHTGRGGFLAALKKL GSEVMVPSILAAHALWREDATARAGRLRAALTGAHAAHYFEEDQ NASILTLLDEAPPKESLPIPRFRRVLGRAENTWKGKEALVLPPTANRRQ LEDPARRCRYTILKALYERPFRRSWLIARAPEEVNAWIDRAIERTTAAK DMNAKRGEDDKRSVIAAKAESLPRLSGERGIGDFFDLSSATASEMRV QRGYGHGDEAAKEQAGYIDDLCDVVALAFDAWLRNPQANGRPLTF ICDLKPETPLPAAPKCTLQEIGSAAEPVRPEDWQAALYLLHLVPVGEA GRLLHQLAKWTVTSRLADDLLNANVTDDPSKAERTADEEDLKRLVHT LIQHLDMDHDAKFEGGDALTGCEPFAALFASRPGFARIFPAEADERLDR RVPKRGLREIMRFGHHGLVASFAEDTRITDKEVGDYLRLEIERPDNVA ALQARKEEAHERWVKAKEKRKTVDPKHLEDYVTALCGIARHRRLASR VTLDQVQVHRLMTVLGRLVDFSGMFERDLYFAMLGLLDEKGARP DEVFSGPIDEPKSRLLANGRVLAALREQIPHSKDLAEELRKDLERLFG MDCSGIRLLEADERGDTCLDIRNDLSHFNLLHDDSFALDITLVNRT GLMSYDRKLKNAVSKSIKELLAREGLTSLWDMTDRHDLENARIGAKP AVHLGGRKLAFRGGDRRPEPVRENHSPTHLEAVARLFGGKVVEEDD VTNLDLSSIDWAAEPHNSKETHRHRPAGPRKSPPKRRAYHAPR
50	cas13a	MRIIKPYGRTLVEHDGAGERKRVLTLRPDHDSKLDIEAFARDHDELVV AQWVSTIDKIAAKPGPRKGATEEQRAFRDRIGKAAWALLVRNALLPG LADADRADRLAKIWRRIAPYGDLPNERPASAKGRWYGAFAGEAD VADVDAGEIAAKIHEHLYDAEYRISGDGRKPDGCIARARSIAVNVLRP ADSSACGQPEWSDRDQAYRVADVAKQIWDAAALSRENGRDGAGTK RVTNSVAGGVLFHWRIFPGPDGKALSIREAIEKEPGLFALHMAVKD CYARILKHHKKAPGRRERENGDVSPIRKVLPRDMDLFAIISGRGNR DLNALVRLGKVIHYTASDPNADHPESITENWPGDLAGSHYWTSAGQ AEIKRNEAFVRVWRHVVLAAARTLTDWGDPHGEIGSDILGKANDAT GAKFDEAAFNKCALLFGKRASHFTAAPDLAFKKAVLKTAIKGMAALR HKSFHFAGRGGFVKALEGIGGLNEIDRFDPVTRALRTLLVEDIEDQSRQ VRATMVGAHFGVYLSKGQVEAIYRAVTGAEPGSLPLPRFSRVLRRAG AWEAEDVLPVPVNRDLQGRGLCQYTGKLLYERPFRRWLEGRSAA KLNGFIYRAVTRASDAARTLNTKESDDWRDIIVARAELGKVPDGGDI HGFFELSAETASEMRVQQAYESDGERARQQAIEYIEDLKCDVVGLAY RSFLETEGDFLRTLDPEAAIAEAHRFDPAELPDPVAVDTDAEDWEAVL YFLVHLVPVDEIGRLLHQMRRKWDLLAHDRTAPVADGGQARLVDKVQ RVFTLYLDLHDAKFEGGEALTGIEPFRKLFEESDGFDITFPPQQGYEEDR

		RVPLRGLREIMRFGDLPPLLSIYGRRPATKSNIERYRRAEVADAGGRSEI ARLQARREELHAKWVEAKKEGLGPEDRRAYVEALAEIVRHRHLAAHV TLTNHVRHLRLMMAVLGRLADFSGLWERDLYFATLALLHRAGKTPRE VFENEGIDLLRNGQIVYALRKLNSSNASALRSGLFPFHGSAFKRGDPI GGIRNAFAHFNMLRAAQPPNLTECINRARQLMKHDKLKNVSKSVI DLLAREGLNIAWAVHTRAGAHDLAEAVLSSRQAQHLGKLRFPVSGD GRDGKGFFIMEDLHGADFEVEMAAELFGGRVSDRWRGKGCSELRLD SIDWSRQREQKKHGGGKKPTGRARKANRGHKNRHRRA
51	cas12f	MSARNIKVKIDTKGNPELRLGLWKTHQVTNEGKYYTEWLIKLRQQD IYRQSREDASPRVIISADLKADLLCHARQLQKERLPITGSDAEILGTLR QVYELIVPSSVGKSGDSKTLARKFLSPLTDPGSAGGRDQASGRKPTW MKMKSEGNPRWEETFRRKWKDRKNDPTPLVLNQIADYGLPLIPLFT DVGENIFDPKSKSQFVRTWDRSMFQQAIERLMSWESWNQVRRE WEALNQKHSIFYREQFTADPDAALYRVAQSLEEEMRKEHQGFASDA PEAFRIRRVALKGFDRLLERWQKTLGKNGQSATLLDDIRRVQSDLGDK FGSAPLYQKLLDERWQRLWAVDPTFLQRYAAFNDLTQRLQRAKRNA NLTLPDAVAHPIWSRYEGANASSGNRYHIHLPTKGQPGSVTFDRILW PDGNGGWYERKRVTVFLRPSHQVDRIHEAPTDSVVDNFPVVEDQS ARTILRASWGGAKLEYDRNRLPRQLKKGVPDSIYLSLTNLNLTNPKPSGL FHTQQNGRVWIRKDVLMQYYNETPGDNVQFKPLYVMSVDLGIRSA AVSIFSVQLKAGIEEHRLTYPVADCPGLVAVHERSVLLTMPGERREQW DRRYEQQRQGLRELRTDMRGMDLLRGAYMDGDRREEFLARLSKLE ETSPELWGPVYRSLNDSKVASATEWERLVVYCHRRQVEQSLSSRIQNL SGRSAYRMSGGLSLDHVQDLERIRGIIASWTNHPRIPGSVVRWQQGR SHTVALGRHILELKRDRVKKVANYLIMTTLGAYDSKRARGEKVVRRY PACHLMVFEDLTRYFRTRDRPRSENRLMRWTHQELIAVTGIAEPH GISVGTMYAGFSSRFDAVTKAPGVRGATVRQILRTRGMVRLKEIAAD VGIDINTLRPHDVLPTGDGEYLLSVVRHGESYRLKQVHADINAAHNQ RRLWTQDEVFRVSCRALNSGRVVAMPPPSYNKRYGKGFFEKGDNQ VYIWKTTGGKIKISDTLEEDMDIPEDTAELLRGNSVTLFRDPSGTIAGGN WLEAKEFWGRVNSLVNKGVRDKILGGIPVDNSSAHAE
52	cas12f	MPMIKITECVTWGTTCDGLWDARPHLEVRRSWSPPVQGGRTNRLD APPASVTLNHGRVEHPRDADALSVAPLRVRHMFERTTTKAAFLSPLD LRPTQATDLERFAGTTRWAFNWANALLEAHHQAYEGRRQQAARHL FGLGPEQLDELRLVLANGTRDENGKKAKGDPVKRREYESIQKATKKAVS EENKALGAEMKLWDEHRSVHVHKGRLPLTPGDEPALDAPPLAHLRYA RRVELAGIQKTDPDYAEQKKEREAITPNVVAMKRDLMAGAYFPS EYDLQYIWRVTVDLPKEEGGSPWWPECPTILFYDGINRARTAWKNW MDSASGARKGPPVGMPRFKSKYKAKDTFTITNPNRSVIKFETYRRIAIT GIGSMRLHRGAKLLARRIAAGQAEITSATISRSQTAWYVSVLCTVHTTA RTAPSKAQSRGAVGVDWGVRLATTSKPIALTPGKPASRTVPAEKY

		GAAMSQKIARAQRQLARMPKGSSRRRKAARHVADLQHLVAQRRAS SVHQLSKALAQSFIVAIEGLNVRGMTKSAKGTVENPGKNIRQKAGLN RAILDATPGELKRQLEYKTKKYGSRLVELDTWYPSSKTCSRCGWVHPK LKLSMRTFRCQQCGLVEDRDFNAAVNIERQGITHIVKENEGTDDREE G
53	cas12f	MSTPMGWTAVNGGDATSPTRVSSPPGEPRTGACPRAAADATRA ESSPRRTSSPARPGERHARARTSRYPINITYVVDPRSAEGDRHGQSSL DCGPCPVRRSGALHQSSQAAHRRSMTGAKQKTPIRVVRFIDHSALT PAQVVAFAHAGAARQTWNWALGRWMDWRNNTKFYVDYKVFKA AGMGPGSLSTDDLIQVIERAVSIRQDDKWMDAAWDEARQIHGEWD QFQKASTLQSLYLAGAQEPFDP SRDDGINPYHWWVTEGDKSGLPKA ERHNVNSGATYTAPLRAFEEAVGRFYKLP GKKGTPKF KSKHDDEQGF CIQRLTETGLSPWRAIEGGHRIKVPSIGSIRVVQSTKRLRQLIKRGKTT SARFTRRGKWFVSVSVAFDLSAPRVQRPARLSRRQRAGGSTGVDLG VNRLATLSSGDQFPNRRLLRKSMAEIKRLQRKFDRQHRAGSPECFNE DGTHKKRCRWGREDDPAMSRSAQTTRQLRRIHDLTARRRAGVLHE ITKDLATRFELIGVEDLN VAGMTAKSKPKPDPRPGHFLPNRRAAKAG LNRAILDVGFYEFKRQLGYKTEWYGSTMQMVHRYAATSKTCSGCGW VKPKLTLAERTFNCTQCGLAMDRDHNAAVNIRALALEGAAPMEREQ PAPVGAAEKHRDPVSHRRRPKSLAPCESTRPVRLSPPATQEETA
54	cas12f	MAQAEAPRRLRAYKFALDPTEAQLREFEQHAGSARWAYNHANAILS RYSIDLNRNWNWIAQHHGLSREQLYALPDRETAIQAAAARA AVKA ENAQLAAELRIIDHRKRVTHKGKPSVEPGEQPAEDAPERAYQLWRE RVELARLHAEDPQAYRAERKRILDEIRPLVNATKRKLIEQGAYRPTAM DISTLWREIRDLPPDEGGSPWWPEVSIYAFTSGFAHAETAWKNYLES AGRRAGRPVGKPRFKKKRRSRSFTLYGSVKLVYRRIQVPSIGSVRLH GSAKRLHRALERRGGIISITISQGGHRWYASVLVDELDTGPRETQRG PSRRQRDRGAVGVDLGVHHLVALSDPNEKTLDNPRHLRKARKRLLKA QRAMSRRRGPDKRTGQEPSRRWVKARNRVARLHHELAVRRAGHLH EITKRLATSYELVAIEDLN VAGMTRSARGTIDQPGRGVRAKAGLNRSL DTSPAEFRRQLQYKASWYGATVAVIDRWAPTSRTCSCGAVKAKLSL AERTFFCEHCGMELDRDINAARNILAFQAQSAYPGEGKALNACGGSVS PGSQSVVQAGADEAGRPARKPRRSSRGSDPPATPTTRA
55	cas12a	MTSSSPTQRAYTLRLKSAAQGDKSWAEKLWDTHEIVNKGARAFGDW LLTLRGGISHKLENLNDKETGEEGKKRRRILLALSWSVESKDFAPEKYI VEKDGEDKHRTKEALEAILKSRNLEDEEVESWVNDCKDSLTSIRDDA VWVNRSRAFDDAVRKIGDSL TREEIWDVLGRFFGKKEAYLAPRTIDEK NGKTKKEPKDLARKAGGWLSKRFGKGKGTDFSKLSKVYSEIVKWAE PRKSEPRTLANLASALKEDSLQGILNLIKNSGSKSGTRNFLEEIGEVS KENLAILKAKAEGNRNYCKKEIGGKGRREWSDRILKSIEETLDGKFTYL

		QEKGPARHWEFAVMLDHAARRISAGHTWIKLAEARRRNFEEDSQKI NEVPENARQWLETYREDRSKSSGAIEGYLISKRAVTEWETVVKAWKN CKTEEDRIAAGALQDNLGIDQFGDINLFRALASEDVRCVWQVDGKP DANILLNYVAATKAEFDKRRFKVPAYRHPDPLLHPVFCDYGNSRWEIR FDVHEVNRTGKKAKQNKKTETADVHGLKMDLWTGSKIENVSLRWQ SKLLEKDLAVKQLDGKEDGKKEVSRLGRAAVGAGWETPVSASSV FAQKHWNGRLQASRKELSRIARRVKTRGWDEKANSMMKNLKWFITF SPKLKLQGPWISYVDNSEDKRPFTFTSKGEPILDEVFSIENKNRKGRRAR LILSRPLGLRVLSMDLGHRRHAAACAVWETLSSRQLEDACAEGGYDKP APDAMYHHIKSNRGRKRVYIRRIGADELSDDSIHPTPWARLERQFLIKLQ GEERKARMATADEIWEVHELERALGRKTPLVDRLTSGSWGSDSGTPR QRQLLGELNQWGWEPDEAQENSEDEITSRESLLVDKLMSTVDTV RKGLRRHGNRARIANFLVAREKTPGGQMDTLNNEGRKEIADALAF WYELANGGEWKDTEALDWWKIHIEPELSVEELPDIAGTGIAPKERKR KKKELKEKLPVAERLLTSGAKKLSQWCERWKQDDKEWQKTLRWL RDWILPRGVRGKSELIRNVGGLSLDRLTTIQSLYQAQKAYFTRITPKGIQ MDKDKPLTAVMNFGGHILNDLENMREQRVKQLASRIVEAALGVGRV KIPKSKDPKRHYERVDAPCHAVVIENTNYRPEETRTRRENRLMT WCSGKVKKYLSESCSLHGLFLWEVPPSYTSRQDSRTGSPGIRCEEVSVE KFFKTPFRQREVARAEKDSKNKASAYEQYLIDLKERWKSARGEETALLR IPRKGGEIFVSANSNSPASKGLQADLNAAANIGLKAITDPDWSGSWW YVPCSSKDFVPIKDKIGGSRAFENITTPMPNPDDAKEATGKKRSGKKEI NLWRNPACSPLEDEWERTAKYWNMVEYHVIKRLKRQMG
56	cas12a	MKNFQDFTNLVELSKTLRFELKPIWGTKKLIEEKNILKDKKKRENEYKV KPYFNKIHQEFINFALRNPNDFSQFEEKYLNWLKDKKNKDLLKEKESI DKIFLEKIWKLFENSVKDFLKENGFEIVKSEDQNLKFFRRKEIFEVLQEK YGSELETQMVNKDWEIKSIFNGWEKWLWYFDKFFNTRDNFYKTDW TSTAIATRIIKDNLKIFLENTIIFEKVKNKKIDFSEVEKNFSVSIDTFFEINNF NNCFLQDWIDFYNKVIWGETLENWEKLKWLNEIINKYRQDTGEKIPY FKKLQKQILSEKDWVFDKIEDDGGFYEVKNFYKNAAEKEWFLKNIFE NFTISDNLEKIYFNKIAFNTISHKFWSALEFERILYEEMKKEKADWIKF EKKENKYKFPDFIQIIFIKRSLNYSNENLFWKERYKSEENVDFLEKN NNNIWEQFCKILNFEFLNILKRRIIDEAWEEYEVWFEISKNILWEKLENF ELNQENKWIIDFADYSLALYSFWKYFAVEKWRNWDNLIDISDDFYG WEDWYIEKFYNTGYDEIVKPYNLMRNYISKKPWEDSKKWKINFETSSL LSWWDKNLESNWSYIFQKWNKYIWIINWSKPAKEVLEKLYSWNGE KIKRFIYDFQKPDNKNTPRMFIRSKKDSFSPAVGKYNLPVEDILEIYDN WLFKTENKDNSNYKESLSKLIDYFKLGFSGHESFKHFNFWKDSKEYEN IADFYRDVEKSCYQITSEFLDFEELKKLTFKKHLYLFQIYNKDFELDESQ KNWYNFRDEWQKNIHTKYFEALFLEENILRKSWAVFKLSWGWEVFF RKESIKAEKEKRKNIEVTKNRRYTEEKYFLHFPIQVNFKNEISWNFNQEI NKFLANNPDINVIWIDRWEKHLAYFSVINQKWEILESWSFNKIENYNK

		NWEKLLFPEREIKEIHKDWSLIDLELVETWRKVDYVDYKLLLEYKERKRL LQRQSWKEVEQIKDLKKWYISALVRKIADLIKHNAIVIFEDLNFRFKQI RGWIEKSIYQQLEKALIDKLNFLVNKNEINLEKAGSILKAYQLTPVDSL KEIWKQTWVIFYTEAAYTSKIDPIKWWRPNLYLKKQNAEINKENILKFD NIIFNSKENRFEFTYDLKKFFWKDSKFPKTVNTVCSCVERFKWNRNL NNNKWGYIHYENLTDWKLANKKEQKEDEFSNFKELFEKYFIDINWNILE QIKNLDTKNNEKFFSSFIDLFTLVCCQIRNTNQNAKWDENDFILSPVEPF FDSRKSQNFWKSLPKNWDENWAFNIARKGLIILNRISENPEKPDLLIFN ADWDNFARNI
57	cas13b	MTEQNEKPYNGTYTLEDKHFWAFFNLARHNAYITLAHIDRQLAYS KADITNDEDILFFKGQWKNLNDLERKARLSLILKHFSLEGAAYGKK LFESQSSGNKSSKKELTKKEKEELQANALSLDNLKSILDFDLQKLKDFR NYYSHYRHPESSELPLFDGNMLQRLYNVFDVSVQVRKRDHEHNDKV DPHRHFNHLVRKGKKDKYGNNDNPFFKHHFVDREEKVTEAGLLFFVS LFLEKRDAIWMQKKIRGFKGGTEAYQQMTNEVFCRSRISLPKLLKESL RTDDWMLLDMLNELVRCPSLYDRLREEDRARFRVPVDILSDEDDTD GTEEDPFKNTLVRHQDRFPYFALRYFDLKKVFTSLRFHIDLGTYHFAIYK KNIGEQPEDRHLTRNLVYGFGRIQDFAEEHRPEEWKRLVRDLDYFETGD KPYITQTTPHYHIEKGKIGLRFVPEGQLLWPSPEVGATRTGRSKYAQDK RFTAFAFLSVHELMPPMMFYFLLREKYSEEASAEKVQGRIKRVIEDVYA VYDAFARDEINTRDELDACLADKGIRRGHLPRQMIAILSQEHKDMEEK VRKKLQEMIADTDHRLDMLDRQTDRIKIRGRKNAGLPKSGVIADWL V RDMMRFQPVAKDTSGKPLNNSKANSTEYRMLQRALALFGGEKERLT PYFRQMNLTGNNPHPLHETRWESHTNLSFYRSYLKARKAFLQSIG RSDREENHRFLLKEPKTDRTQTLVAGWKSEFHLPRGIFTEAVRDCIEM GYDEVGSYKEVGFMKAVPLYFERACKDRVQPFYDYPFNVGNSLKP KGRFLSKEKRAEWEWGKERFRDLEAWSHSAARRIEDAFVIEYASWE NKKKIEQLLQDLSLWETFESKLKVKADKINIAKLKKEILEAKEHPYHDFKS WQKFERELRLVKNQDIITWMMCRDLMEENKVEGLDTGTLYLKDIRT DVQEQGSLNVLNHVKPMRLPVVVYRADSRGHVHKEEAPLATVYIEER DTKLLKQGNFVSFVKDRRLNGLFSFVDTGALAMEQYPISKLRVEYELAK YQTARVCAFEQTLELESLLTRYPHLPDESREMLESWSDPLLDKWP LQREVRLLIAVRNAFSHNQYPMYDETIFSSIRKYDPSSSLDAIERMGLNI AHLSEEVLAKEMVERIIQA
58	cas13b	MESIKNSQKSTGKTLQKDPYFGLYLNMALLNVRKVENHIRKWLGDV ALLPEKSGFHSLLTTDNLSSAKWTRFYKSRKFLPFLEMFSDKKS YEN RRETTECLDTIDRQKISSLLKEVYGLQDIRNAFSHYHIDDQSVKHTALII SSEMHRFIENAYSFALQKTRARFTGVFVETDFLQAEKGDNKKFFAIG GNEGILKDNALIFLICFLDREEAFKFLSRATGFKSTKEKGFLAVRETFC ALCCRQPHERLLSVNPREALLMDMLNELNRCPDILFEMLDEKDQKSFL PLLGEEEAHILENSLNDELCEAIDDPFEMIASLSKRVRYKNRFPYLM

		RYIEEKNLLPFIRFRIDLGCLELASYPKKMGEENNYERSVTDHAMAFAFR LTDFHNEDAVLQQITKGITDEVRFSLYAPRYAIYNNKIGFVRTGGSDKIS FPTLKKKGEGHCVAYTLQNTKSFGFISYDLRKILLLSFLDKDKAKNIVS GLLEQCEKHWKDLSENLFDAIRTELQKEFPVPLIRYTLPRSKGGKLVSSK LADKQEKYESEFERRKEKLTILSEKDFDLSQIPRRMIDEWLNVLPTSRE KKLKGYVETLKLDCRERLRVFEKREKGEHPVPPRIGEMATDLAKDIIRM VIDQGVKQRITSAYYSEIQRCLAQYAGDDNRRHLDISIIRLRLKDTKNG HPFLGKVLRLPGLGHTKLYQRYFEEKKEWLEATFYPAASPKRVPRFVN PPTGKQKELPLIIRNLMKERPEWRDQKRNKSHPIDLPSQLFENEICR LLKDKIGKEPSGKLKWNEMFKLYWDKEFPNGMQRFYRCKRRVEVFD KVVVEYSEEGGNYKKYYEALIDEVVRQKISSSKEKSKLQVEDLTLSVRR VFKRAINEKEYQLRLCEDDRLLFMAVRDLYDWKEAQLDLKIDNML GEPVSVSQVQLEGGQPDVIAECKLKDVSKLMRYCYDGRVKGLMP YFANHEATQEQVEMELRHYEDHRRRVFNWVFALEKSVLKNEKLRRFY EESQGGCEHRRCIDALRKASLVSEEEYFLVHIRNKAHNQFPDLEIGKL PPNVTSGFCECIWSKYKAIICRIIPFIDPERRFFGKLLEQK
59	cas13b	MESIKNSQKSTGKTLQKDPYFGLYLNMALLNVRKVENHIRKWLGDV ALLPEKSGFHSLLTTDNLSAKWTRFYKSRKFLPFLEMFDSDDKSYEN RRETAECCLDTIDRQKISSLLKEVYGLQDIRNAFSHYHIDDQSVKHTALII SSEMHRIENAYSFALQKTRARFTGVFVETDFLQAEKGDNKKFFAIG GNEGILKDNALIFLICLFDREEAFKFLSRATGFKSTKEKGFLAVRETFC ALCCRQPHERRLLSVNPREALLMDMLNELNRCPDILFEMLDEKQKSFL PLLGEEQAHILENSLNDELCEAIDDPFEMIASLSKRVRYKNRFPYMLL RYIEEKNLLPFIRFRIDLGCLELASYPKKMGEENNYERSVTDHAMAFAFR LTDFHNEDAVLQQITKGITDEVRFSLYAPRYAIYNNKIGFVRTGGSDKIS FPTLKKKGEGHCVAYTLQNTKSFGFISYDLRKILLLSFLDKDKAKNIVS GLLEQCEKHWKDLSENLFDAIRTELQKEFPVPLIRYTLPRSKGGKLVSSK LADKQEKYESEFERRKEKLTILSEKDFDLSQIPRRMIDEWLNVLPTSRE KKLKGYVETLKLDCRERLRVFEKREKGEHPLPRIGEMATDLAKDIIRM VIDQGVKQRITSAYYSEIQRCLAQYAGDDNRRHLDISIIRLRLKDTKNG HPFLGKVLRLPGLGHTKLYQRYFEEKKEWLEATFYPAASPKRVPRFVN PPTGKQKELPLIIRNLMKERPEWRDQKRNKSHPIDLPSQLFENEICR LLKDKIGKEPSGKLKWNEMFKLYWDKEFPNGMQRFYRCKRRVEVFD KVVVEYSEEGGNYKKYYEALIDEVVRQKISSSKEKSKLQVEDLTLSVRR VFKRAINEKEYQLRLCEDDRLLFMAVRDLYDWKEAQLDLKIDNML GEPVSVSQVQLEGGQPDVIAECKLKDVSKLMRYCYDGRVKGLMP YFANHEATQEQVEMELRHYEDHRRRVFNWVFALEKSVLKNEKLRRFY EESQGGCEHRRCIDALRKASLVSEEEYFLVHIRNKAHNQFPDLEIGKL PPNVTSGFCECIWSKYKAIICRIIPFIDPERRFFGKLLEQK
60	cas13b	MDTPNFSERIPVSLQSHPYFAHYLNMARHNAYVILEYVNRELIKPGK NLDEDNLIQSTVLKDGDFDRKPDELSHRNRLVQHFPFLREAENEGAR

		TCNPVSYKLKTALAALNQWRNNASHYPLNQNHKDFDLQPFSSFAIE ACKKRMREVFQPDFFYLLETNEKQFYTLHNENGFTTEKGLYCFICFFLEK KYAFQFLAGIKGFKNTTNDKFRATLETTEHCCRLPKPKLDSSDIKLDL LGELSRCPAPLFDLLDIEERKKFIREPEEVKPDSESGDREEVQQVLMKRY DDRFPYFALRYFEEKNLLKGISFHHIGRWIKSEHTKKIMGAERDRLLK DIRTFGELKEFSPEHAPDYWLRDGITPDDVDQFSPQYRIVGNRIGIKLN YNGHNRWSVPDKEINVKPDIIISTYEFNLFLYEHLYQKLTGLSPAEFI QDYLD RFNNFLSEFKAGHIRPVGDFSLEKRRGQGDEPDLTARRKSLOK ELDRFVLKGDLPDKIREYLLGYKQKSEKKQAKWILGGMKETVYWRN KAEQSPEKMRSGDMAQQQLARDIIFLTPPHTVKEHKQKLNLSLEYDVLQ YALAYFSSNREKLYSFFKEHQLTVKGDRAHPFLYKIRLDECQGILDFFIVY MQQKEKWLGWLDRLNLSKSPRLNEEEFFNTYSYFIKTDTKRAIEMDYES CPNYLPRGIFNEPIAKALQKAGVKIKDEDNASYALSVSNGKTQPFYNK ERYYNKGIFRMEELPEKLQPKELLGKIQWTIKSSGKDTEEFRLQNLKN RILNTEKEIRYVQSTDRLWIMVADLPETFELRPDDLECIGHDLSDDLL SRPYQMKEKVNYTITDYLPIKRYGEFRRFLKDRRLNLLTYFEEGVPLH REALVAELEAYDLQRKNLLEIIRFEKLVFDRHRHELTFSGEGENQYVN HWDYDLFVARKYGLSAEVKELNSERFTELNRNMLHNQIPYQLWIKEAI AAREENTVCGRIMGMIGEIERMTTEIEKQMQV
61	cas13b	MFDNEQKNLEKEPYWGVFLNQARLNAYIALRDISERLEENAADEDSLS EWPVLKYLDNDTDAVKSRRIFDLVEKHFSMLKIIYGGEKEGDLVKRSKE YKIIKCLFRALNFYRNKFCHEMYSGNRARKYNEKELIKYLED CFDA SVRK IKELRRLDEKDVHLRRKIAEGKDANKRVIDNPQFRYPFKNEKGELNEK GLYFLASIFLDKKEAHEFLKKQEYFKNDSEPKYRATLESFYHYRIKLPRPV IESDVKNGLDMLNELKKCPKELFDLLSKEQQEKFRVVDSEDADEE GNEILMRRYSRFPYLALRYCDENQVFERIRFQIDLGRYYFKFYPKETID GKTQQRSLDKRLKIFGRIKDVKSKEQEWSGIISPDTIEENPNEPYKLL TTPRYNIVDNQIGFVITGDKNLPDVKRPDGRIELEKPDGWLSIYELPGM LFHGLKYGFDKTERMIKIYIEKQRKICKEICEKGTITPDDGESMPEALKG GAKAAKRNYSKLERMLQDTEQRIRAIQTQKRMDEPGNKPGKKKF FDIRAGKLADFLARDIMALQRFDPAKHGKDKLTAINFQVLQATLAFYG AKKDVIEDMFKGIGLLEGDNPHFLNQIDPAQYNSIAGFYQAYLQKKR SYLEDYRKEEYDEQFLRPKRQRYAQEKREIKTVARQLLDNPVNVPKN FFKKEIEEFVFSQDPSLKKSKMNTAYMIQALFEKHYGRQQPFYSYNRT YPVVS KAIEYGKKGKNKIAKVLMAIEPKLNYMEIKKIVNEMP DGQYE PENLKRNL YEGYKDYEKDERIIRCKVQDVVSFMMVEETLKDQLDFN GNVLTLEKITPWEASPFKKPVLCHTIISIPFNTKGGHTDKDYVDFIKNNF EGSYDCEPNKIILKYVTSKDTKLKDIGKYRMYSHDRRLPGLLIWKYRP NDQNGNEIKFTEIEQEIKAFERRRIEIAQCLYCLEKKVIDSWFTQDELGE EHIPFNKVIDVIKAKMPNFEDKCNVLLKIRNAINHNQFPVVEQAIQTAP GKEIAGKMLRITESYIEQIMAKIDPDFGRTEDAESSR

62	cas13b	MDTPNFSERIPVSLQSHPYFFAHYLNMARHNAYVILEYVNRELKPGK NLDEDNLIQSTVLKDGYPDRKPDELSHRNRLLVQHFPFLREAENEGAR TCNPVSYKLKTALAALNQWRNNASHYPLNQNHKDFDLQPPFFSFAIE ACKKRMREVFQDDFYLLTNEKQFYTLHNENGFTTEKGLYCFICFFLEK KYAFQFLAGIKGFKNTTNDKFRATLETTEHCCRLPKPKLDSSDIKLDL LGELSRCPAPLFDLLDIEERKKFIREPEEVKPDSESGDREEVQVLMKRY DDRFPYFALRYFEEKNLLKGISFHHIGRWIKSEHTKKIMGAERDRLLK DIRTFGELKEFSPEHAPDYWLRDGITPDDVDQFSXPQYRIVGNRIGIKL NYNGHNRWSVPDKEINVKPDAAISTYEFNLFLYEHLYQKKLTGLSPA FIQDYLDRFNNFLSEFKAGHIRPVGDFSLEKRRGQGDEPDLTARRKSL QKELDRFVLKGDLPDKIREYLLGYKQKSEKKQAKWILGGMKETVYW RNKAEQSPEKMRSGDMAQQLARDIIFLTPPHTVKEHKQKLNLSLEYDV LQYALAYFSSNREKLYSFFKEHQLTVKGDRAHPFLYKIRLDECGILDFFI VYMQQKEKWLGWLDRLKSPRLNEEEFFNTYSYFIKTDTKRAIEMDY ESCPNYLPRGIFNEPIAKAVQKAGVKIKDEDNASYALSVSNGKTQPFY NKERYYNKGIFRMEELPEKLQPKELLGKIQTWIKSSGKDTTEFRSLQNL KNRILNTEKEIRYVQSTDALWIMVADLFPETFE LRPDLECIGHDLSD DLSRPYQMKKEVYNYTITDYLPIKRYGEFRRFLKDRRLNLLTYFEEGV PLHREALVAELEAYDLQRKNLLEIYRFEKLVFDRHRHELTFSGEGENQY VNHWDYLDVARKYGLSAEVKELNSERFTELNRNMLHNQIPYQLWIK EAIAAREENTVCGRIMGMIYERMTEIEKQMQV
63	cas13b	MKTALGALSSHNNYNNKKYFSGLLNTAQYNFNLALQEVNDRLGKKGKN PGKTMKINIFDQKDSFSTQERAMYYLEEFFPWIFLVMKQSGINIPTEE QETKLHKEEIQLIQEHLISLYELDDLRNEQTHYMHDPVPIPEEVSKMLD ALLQILKNTRKKCKDDEYRTFIVKKYQEEFQKEIKVQVKDRFGKEKEKI VTGEVKENYVINRCFRKWIQKEGEEETLRYSTVQEEQKYVWSSSGFV FFLSLFLRRKELEDVMNHVPYFKDSRKLFLYLRKTFSSYCFRDLRSLRS DYSNDSLLMQMIEELYKCPGELYEVLLKEQKQEFIEDINEYYKDNPEFE GSANEAQVIHPVIRKRYQDKFPYFALRFIDEYFNFTLRFQLVLGEYVT DRRTKELQGTALFTDRVISQRISYVGKLSEAEMNKKREGYTETGWKEY PNPYYKIENNRIPLYIEFSKNEELIFKEKKFKYNTLAKWENREIDKRTGEF NQVNKQRRITQLEEFKIDNPCKMKTPNVFLSIYELPALLHALLIEKKTEA EIEDIIKAKIKKQLTEIAEGRRNLSGLPKGIKKMRNCNSDFEKKKLISDID NEIKKGEKILEEVQQWLNPNVINKKGTGKQENNKPFSSNTYRGKYATW LAYDIKRTGKDHIQNWKGYSFELQTLISLYTLRKEELKNFLEKDLQLT SHPFLKEALKAVNLEDFMGAYLRGRQFFLEKAKKQIGIKGVKKSIFQYF EERKYKIYSSNLDYWEELWKHPVNLDRLGDFDERGTVYNKNKELNDLQ NRAAWFSFAETNPQQFYHFPRIYSDEDITKPVTDYRGKTEKLILFKLS PQKGFMEQIPSDLKKKYQEDKGKVEHPEVQKEKKYEEKHHPGINAFIK NAYKNEQKIRRIISNDIFLYEMVKYMLNKPATEFSSLDKVLTRIERE KQATEAREQSFEKGDTSNKIRQDYLLSFPTLTLFNDIIKEKVKIKDIG RFRKLEKDERVQTMISYYTSGLWKNDQPSLTIKELEAELESYHKIRLQEI

		FKEVHKLEKEIYEFTPEEDKSKLLARESFPKFKYYISFYFIPKEDQEVFNEI QFDKYKNLEQIPGRKPEYDPYLLIFIRNKFAHNQLPAEPIYKTALTFLP NNFNTLAEYYHKLFIILLNNKNYNN
64	cas13b	MNILPAAPEKEKIAYSTATAPWFFGAFLNQARHNLFTVNDLAILRGE KVIDYDDQLLSNVVRMLVNEKASPLQLEILMKYLDRLHLPFLIPMQVA LKGHQGDASDNPIVIGSPADYGAILSKLIVCLNAARNHFSHYHSTSGWS GYNEVIEWMEHVFTRNIEVVKRFTLTTEEYVQHLKKPVDKSPKGTIPPY YFSFCKGDIWTDGLAFFICLFLTREEAYLFLKKLRGFKRGEERFHKATLE AFCVGSCLKVPRERLESNNSPQSAFLDMCNELVRCPSLFDLLEPEKQEL FRRDPEPEDAEDNGIEEEDQPQALLVRKENRFSYFALRYLDIAKAFPR LRFQVLDLGTFFSVYPKTFAGIEETRQLSKRLIGYGKLEEFAREKRPEHIA ALFRSKEEANAAPTEPFIRETAPHYHLDGNNVYLYMSGDGEAQWPAV ELEEVTKGSYPRKLVKKSTLLPFAVLTVNELPALLFYHLLHKEKGAGDAA ERVIIHMERVKRFFKALQDDKVDQVAGQPIRKPDVDAESLHMEY DRRWKLLKKKLSEYQLRASYIPEKIINYLLNIEAVDLGDKAMAQLKNLQ RQAQDDIAIERRMEHLMKKGADGRKTLKVGNLAQQLAEDMLQM QPVQIGTDGEPVPASKANNLAFRLQSHLAYFAENRHNLPVFEACGL IGASNKHPFLDNINIESCKGVVDFFILNFRNKLDLDRCLQGEWHRYH FISAAKLKSGAKVTIKKYLNEAFESKGRNHIPFTLPPSLFDASLDWLAKF GDGKAKKVLAEENEYVNSVFLIRRLFADGGLQPFYAWKREYRLFEEKAG KAVFLDEAGRMKADKIGIEVERHREFLARPVKKGKQYDIKAAAEQF LRSYRFYLQEEKYIRLLAAQDMLLFRCICDLLTYHVGDIGLEELAEAKAG TFLANITPEKTETAKSLLNYRPAGGVVLDHRFYATDEKGAFVKQEGKL VPGGQVRIFDNTLKIKNAGNFRKLLKDRRMNNLFFYFKQHADEPVVL HRMVLENELRAYDRMRKVLPIAEFEKKLYQHCTDVEKERLVVNGS MHHRCYLDVYREKYQPDWGWAEAGNLLRIRNAFVHNQFPLMEGD GFKLEVAHWKKINADFPVSEQSSLGYGIIIDRLGQLAVEGYEGLIKNIH V
65	cas13b	MGEEEAHILENSLNDELCEAIDDPFEMIASLSKRARYKDRFPYMLRLY IEEKNLLPFIRFRIDLGCLELASYPKKMGEEENNYERSVTDHAMAFLRLT DFHNEDEVLLQITKGITDEVRFSLYAPRYAIYNNKIGFVWTSRSKKSFS PTLKKKEGEGHRVAYTLQNEESFGFISYDLRKILLSLFDEGKNIVSGLF KQSKANWENLSENLFDAIRTELQKEFPVPLIRYTLPRSKGGKFVDPKLA DKQEKYESEFERRKEKLSEILSEKGFDSLQIPRRMIDEWLNVLPTSKEKK LKGIVETLKLDCRERLRFVFEKREKGEHPVPPRIGEMATDLAKDIIRMI DQGMKQRITSAYYSEIQRCLAQYAGDDNRRHLDSIIRELGLKDRKKGH PFLGKVLRLDHTTEKLYQRYFKEKKEWLEATFYPAANPKRVPRFVNP PAEKQKELPLIIHNLMKERPEWRDWKQRKNSHPIDLPQLFENEICRL KDKIGKESSGKLKWNEMFKLYWDKEFPNGMQRFYRCKRRVEVFDKV VEYSEEGGNYKKYEEALINEVVRQKISSSKENSKLQVEDLTSVRRAF KRAINEKEYQLRLVCEDRLLFMAVRDLYDWKEVQLDLNIDNMLGE

		PVSVSQVIQLENGQPD AVIKAECKLKDVSKLMRYCYDGRVKGLMPYF ANHEATQEQVEVELRHYEDHRRRVFDWVFALEKSVLKNEKLRLYEK SQEGCEHRRCIDALRKATLVSEEEYKFLVHIRNKS AHNQFPDLEFGKLT PNVTSGFCECIWSKYKAIICRIIPFIDPERRFFGKLEEQK
66	cas13b	MRIPKLIIEHKS VFGAYSTMALSNVETVLNHIAERAGLDGYERDRGPG VEDYWEHPVMQCLCRKDKPRSIPSDVLLDVRNRLFRSFPFLKIMAEN QRDYRNAKGKVECEINESDIFVVLNNSFRVLKAYRDTCTHYLIENRIW EDNSPMLMYNECPLAAMVNQYYTAALRVTKERYGYETRD LTFIQRR FKQEPEKEASGNVKKKAVPD LAFFLSLVALNGDGRKWLHLSGWGVVL LICLFLEKKYVNVFLSKLPNPGNYPPSSKERRIIRSMGVCSVLPKERIH SETGDL SVALDMLNELKRCPRELFDLSPGDQERFRTISSDHNEVLQM RSKDRFAQLVLQYIDHNRLFENLRFHVNMGKLR YLFNPKKYCIDGQTR VRVLEHPLNGFGRLQEME EKRLQENGPFARSGIKVRCFDEVRDDAN ESNYPYIVDTYTHYVLENDMVEMFFCPEGSGMKMPEVTSREGKWYV DKKVP HCRM RMSVLELPAMLFHLLCGAKNTEVHIGKVCDNYCHLFS DMAQGNL TEENILSYGIKKEDIPQKVWDCVRGVHMGKDSRAYREKEI RERYEDVTRRLERLEADRKA VLGGENKIGKRGFVQIVPGR LAAYLATDI CRLQPSLRKGDGYGTDRLTGLNFRLLQSS IATYNCGESDILYGRFRDVF CSAGLIGGDNPHFPLDKVLPEAYSVCCPRNTIEFYERYLEEYQRYLKPLV IKLEKGKVP SLSFVNEGQRRWARRDDAYYHELGNLYLSQAIELPRQMF DDEIKDKLREMP EMRDVDFDHANVTFLIGEYLKRVRHDESQEFYSWP RHYKYV DMLKILNPKNGSLQAVYIQMGEREGLWQERSELEEKYAKIR LRDLGRKGLDKDEANERIKTGLGNRKKEYQKA EKVIIRRYKVQDALLFM LAKNTLFNSVEVDDERFKLKDIMP DGEKILSEVVPMDFCFRSGNSAT RKLMTIHS DNTKIKNYGDFFALANDKRMVTL LPLVGEQCLVKEEVKE EFDKYDDCRPEMISMVDFEQWAYSAYPEL KELVSNEAIKGR LFSNLL QELLGRGELTYEEKYALVGIRNAFLHNSYPKDG GGVVKVRTLPDIASLK DVFKEYIRLE
67	cas13b	MKMFYKSVLTAFFTA VDSL RNKYTHYSHKDLNIREIKIECTLG GKDYCI GLLNALDCIYDS AVNLLKLRFMAGEDEVAHLRRCKAVNKKVVVRTEKD GFYYRLSDNGGVTEKGVIFIASMFLNRKYGFLFLKQLEGFKRSDEKRYR LTLEAFLAFSNIKPVDRLKSDKLDRASLG LDMNLTKIPKELSETLSVDC LYKYLASDGEDDLRSRIRYQDRFVPLALEFISQSDEFKDFRYTYVGNVY YKGYIKRLIDGTDKERYLSDRLCGFYKSVNDASSDAIAQKYGVEIKDSNE PDYMLPDSFRPHVLRATPHFVINTN NIGIKICGNDCLPIVNGKGVESPE PDYWLSIYELPAMLFYAYLREKNGKRFKDYKSIRELIEGVEKKADEKND RDKGALMARHIDKEI IWTQTKLDEVKRLEEKVAAYGKKGRVVLKAGR MADLLAHD MVRLQPATKGS DKITGANFQALQVSLAYFKRDILADVFS RAMLT TG NHRHPFLYRIDVSHCSSLRDFYVAYLGERRKYFEDVAKKIAK NKL NTPCHILRRLQREGSGEEAGKDV KPKFLPRGIFTDSIKNCLEQSKL NIYIRNARN DVKPAINAAYLILMYYKEIEKGEFQGFYGEKRRYDILEEGK

		PLDLAERKKALASIKPAKIDVSEANMPMSKEEHLMRKRYHAVCNNE AIRMYQVQDILLLLMAKDIFKKALSEGVMSSKIGLENLNGIFDAPVNFV KNFDNIKLATGIKIDYGVKVCRLGTDFKFNSLIKAFHKVYSKSVEMDYS DYLKEEEFEKYRLNMVKLCREVERGITEDLHLSLDGKSHLSFNDDVIK YNDKYNVFNNGDLTFFINARNMFMHGDYKYECVKYVVSEHFKGS LNDVSFAKETYGHCNLLSMRKKTGRLRDI
68	cas12g	MLPTRYKPARTLVRPLGRLPHEPRKEFVEKCRVRMHFEQFNIDVADL CQWLMSLRPNTRIGDAQSTVFWDFLNPSILTVEADEKERDRWRLAA FDELLQIRFGHDPNAPPWSEEFSAIRHVAQRPKSATAQRLDFRLRSL TAPHLVLLKSAAEWIIARYQRGMENWQRQFAEWQREKEEWEAAH PNLTPEVRDAFTRVFNLFENPDGDGKIGVRRKNPRICSWERLKLND NCVYAGQKGHGPLCWEFSKFVKAQKNAGTIKTFVDVANKYLHVRR NLSKPGVKLKKSPRQEAFLRYNQKGMKARNWFTDAWSGYLTALN LNEKTILDHGCLKHCGAIGAEFEKSLCQFNPHTHLCVQYRNALESLEPA IRELEGDYREWRRFLAPPRKPSFRYPSSRRLPMPKIFGEHFHQIDFDQ SILRLRLDMAEGEWIEFGKPWP KDYRPGKDEVRTSVHVNFGNR MRAGFHFEAPAKPSRFACTQDELDDLRSKQFPRQSQDRQLLEVARRR LLESFDGMLESRLILAVDLGEKGAAAAYVQGHGHEADVAIPIVKIDRL YDHVPDVLDESARVPPKFDSDRDPGRVKEHVGRHLGQLQRGAQ TLAQRQQDESAPALRRHDFRSLTRHIRWMIRDWTRHNAAQITAA AETHRCHLIVFESLRGFKPRGYDQMDFAQKARLAFFAYGRVRRKVVE KAVERGLRVVTPYGFSTQICSECGHRQRNKGRLRKNKYQRFRVCEC GEPKKSANKTAAPDRSATVSPCTCRLQLGSDVNAARVLARVFWDEIV LPTREEMREPAVDSAPPSK
69	cas12g	MCLCTLSGRTRQEEIIGSTQYTEARSLVRRIRRRPRGESRRQKSNVLL RRHFEQFNVDASEICQWLMGIRPGGRHADESTGPFWEFFLDPRFLR ETGRGPEDADERIDAYRRIAFDVVAGIEDESRMSDPSIPRQIVESLH AVSMATRTESARRLFRERLAGLEPSHRQILLKAAAEWIVSRVRSVQGW PDRYKHWSDEKEEWEKAHPRLTESLREEFTGIFRDLGIRKKPRVCPWE RLEKGMDCNMYAGERIKVGYSRQSHSQLCAKYERFSYKQRQRTKSGK NFKSYFVKNAELYKLRRKNRSLIKKDVMLFRKKVPQALWFEKAWDE YLKALGVDEATLTGDKLPHTQFADDKECLFNRHTELCLQYRERLLRL PHLQLEQLYREWDRKYLSGPRRPSLRYPKRTLPMPKVFGRGYFCAD FTNSLLDLRLEGMGEQDFVRFGFAPWPADYDAQPSDATVTSVHIHFV GTRARAGFRFQAPHKTSRFASSQDEIDDLRSRKFPRAAQDGEFLDAA RKLLLESFTGDAEREMKLLAVDLGDRGAGAAVFEGRCFKEAMPLKIIK TDTLIDKPPPVTKTPRKGKPGKRESKRARGLDKYHVARHLDTWRKGA RKIAERRAKGEADPVKLGADHMRSLSLHVRWMIRDWVRLNASQIIKT AESHKTDLIVLESIRGFSAPGYHKLDDDEKKRTLAFAYGRIRRKLEKAV

		ERGMRVVVAPYLRSSQVCAECGREQIDRNKLMKDKRRRFICEYSDC TWQCSDSQNAACVLGRVFWGEIELPSERKKD
70	cas12g	MHPSRYKTARTLVRRCLRLPGEDRSAFRSKVGLLRGHFEQFNVDVSEL CQWLMSLRKRNVKVPENPATFGALGDFLLQPLGPEETDEKEADRLRL AVFDAVAGFRMLEDRLAASIPASLSDAIRDEAVFLAGVRAAGKPSGLA RVLARLEACAPAQRLVLLKSAAEWIVARFLRGTENWMMRQRAEWEKE KAAWEAAHPHLPTEVRAQFNKIFESLHDPENSGKPGVSRKNPRICPW DRLKQNLDNCCYGEKGHSALCWRYQDFLKQRMGENRRDKKNFSAT AMDLAQICREWIKIHSRNALNNPRVLDRLFAEHERRKQDKTKKESRS PKPRQGGYKANPKADYLRSEKAWKAYLEHMKLNDDTTVLERGCLPH CLSIKNGKESTCKWNKHTELCLEYKRSAPLPSVLELEPEYREWRL YLHGPGRPHFRYPSAGELPLPKVFGEGFHQVDLDRSIVRLRLGAAEG EWLEFGFIPWPRGYQPSRREVLITSVQVHFVGTTPRAGFRFDVSHRTS RFGCSQDELDELRSRRYPRQAQDKEFLAAARAQLIQTFEKGGAARQ QMRVMSVDLGEKGACASIYEGRTHQKDESLKVIKIDRRYDQHPEVLE KDVGAAPKQKFEKSDPRGVRKEHVARHLNRIAAGASIAEHRRKERS DAECVGEHQEHDFRSLKRHIAWMIRDWVRLNAAQIIDVAKQHCCDL IVFESQRGFRPLPGYDELDRGKKQRFALAFGRIRRKVVEKAVEHGMRV VTVPYFASSQVCSACKRVQENRGSWRENKKRVFACEFCKLKLNSDA NASRVLARVFWGEIELPEPTRAHLPSKA
71	cas12g	MPVSRYSERTLVRLARLPHEERQDVTPKVARLRRHFERFNVDVAEL CQWLMGLRNQFGPKESPASFGPLGDFLIEPALDNIDAETERDRWRL AVFDAVAGFRPIRGLGDHPVPTLRLAMQQAASLSPTPTTARLLERLR PLSPAHLVLLKSAAEWIVARYQRMENWVIQHAAWHKEKEAWER EHPALTPAVRERFTALYKQLSDSKPTDRPVSRRKNPRICEWERLRQNID NCCYAGEKGHGPLCRKYANFVKARKAVDGGKFNDDLFWDTATSFIALC RKFNVTARNALQSQDLALFAEDQRRKAERDQAKGRQPRPLHPQAA ARAKSDFLRIFKDGWNAYLSAMGLNDSTAIEKGRPLPHCQKIGGTFENS KCEWNPHTDLCHQYRRLAGQLDDATLAEKDYREWRRRLYLAGPRKPS FQYPSSRDLPMPKIFGAGFFELDMDRSILRLRLDDMVEGEWLEFGFKP WPREYTPSRAQVARPGRITSVHVNFISRCRVGFRFEAPHAGSRFGCS QDEIDQLRRDHPREDDQPFLEAARKRLVETFAGDARRDLRLAVDV GEKGCCAAVYQGRYVADALLPIIKINQLYTEPTELKPDShNRPApDR RPFNDEKDPDRGVRKEHVARHLKRMADKAPEVAAYRLAQREKAA PSPSASPPVTLGVHDFRRLKRHVWWMIRDWARHNAARIVAEQRRH GCDLIVFESHRRRPPGYHEVGDDAERRKLDNATFAFGRIRRKVTEKA VERGLRVVTPYHCSSKVCSCGRLQENDGLLRNKKERKFICEQCKF ETNSDGNAARVLARVFWGEIMLPSPEERRKKREGSGGRSPTPANPG GLVDAPPSRRNLR

72	Cas12	MEDYSGFVNIYSIQKTLRFELKPVGKTLEHIEKKGFLK KDKIRAEDYKAVKKIIDKYHRAIIEEVFDSVLHQKKK KDKTRFSTQFIKEKEFSELYYKTEKNIPDKERLEALSE KLRKMLVGAFKGEFSEEVAEKYKNLFSKELIRNEIEKF CETDEERKQVSNFKSFTTYFTGFHSNRQNIYSDEKKST AIGYRIIHQNLPKFLDNLKIIESIQRFRKDFPWSDLKKN LKKIDKNIKLTEYFSIDGFVNVLNQKGIDAYNTILGGK SEESGEKIQGLNEYINLYRQKNNIDRKNLPNVKILFKQI LGDRETKSFIPEAFPDDQSVLNSITEFAKYLKLDKKKK SIIAELKKFLSSFNRYEYLDGIYLANDNSLASISTFLFDD WSFIKKSVSFKYDESVGDPKKKIKSPLKYEKEKEKWL KQKYTISFLNDAIESYSKSQDEKRVKIRLEAYFAEFK SKDDAKKQFDLLERIEEAYAIVEPLLGAEYPRDRNLK ADKKEVGKIKDFLDSIKSLQFFLKPLLSAEIFDEKDLGF YNQLEGYYEIDSIGHLYNKVRNYLTGKIYSKEKFKL NFENSTLLKGWDENREVANLCVIFREDQKYVLGVM KENNTILSDIPKVKPNELFYKVMYKLIPTPHMQLPRII FSSDNL SIYNPSK SILKIREAKSFKEGKNFKLKDCHKFI DFYKESISKNEDWSRFDKFSKTSSYENISEFYREVERQ GYNLDFKKVSKFYIDSLVEDGKLYLFQIYNKDFSIFSK GKPNLHTIYFRSLFSKENLKDVCCLKNGEAEMFFRKK SINYDEKKKREGHHPELFEKLKYPILKDKRYSEDKFQF HLPISLNFKSKERLNFNLKVNEFLKRNKDINIIGIDRGE RNLLYLVMINQKGEILKQTLDSMQSGKGRPEINYKE KLQEKEIERDKARKSWGTVENIKELKEGYLSIVIHQIS KLMVENNAIVVLEDNLNIGFKRGRQKVERQVYQKFEK MLIDKLNFLVFKENKPTPEGGVLKAYQLTDEFQSFEK LSKQTGFLFYVPSWNTSKIDPRTGFIDFLHPAYENIEKA KQWINKFDSIRFNSKMDWFEFTADTRKFSENLMLGKN RVWVICTTNVERYFTSKTANSSIQYNSIQITEKLKELFV DIPFSNGQDLKPEILRKNDVFFKSLLFYIKTTLSLRQN NGKKGEEKDFILSPVVDSKGRFFNSLEASDDEPKDA DANGAYHIALKGLMNLLVLNETKEENLSRPKWIKN KDWLEFVWERNR
73	Cas12	MKKFTNLYSLSKTLRFELIPQGKTLENIQKSGILEQDNSRAEKYEKIKKI IDDYHKFFIEKSFTGKKIDDYFLNQYFELFKIKDKDEEQKKDFKSIQEN LRKNIISFFDNKLNKRLFEKEI IKEDLPNFVKEEEDKKLISEFDKFTTYFV GFHENRKS MYSEEEKSTSIAYRTINENLPKFINNIFVFEKISKTPISENF RELYKDL E EYLN VNDIQDIFKLNYSNVITQKQIDVYNLVIGGKTLEN GTKIKGLNEYINLYNQNTDKKNKPLLTVLVKQILCDRDTISFLPEQF ENDIDVLNLIKNTYSNMEKSIKDIKDLLSNLKDFDLSKIYITNDIALTDI

		SQQVFNNYSIIINAIKENIKKENPKKKTENEEKYGERIDKIFKSNNFSI KYINDCIKEKNIEIYFMDFGKKENNKVKNLFDLQNNYSMVKDLE YKKIQSLIQDEKSIELIKNFLDSIKNIQHFLKPLYVKDNDIVKDISFYRDF EELYLNIDKITPLYNKVRNYVTQKPYSVKKIKLNFENSTLLAGWDLNK ERDNTCAILRKDDLYLAIMDVNNRNVFNEKGIDGIGYEKMEYKLLP GANKMLPKVFFSKSRIKDFNPSEQIIRNYEKETHKKGSNFSKDCCHKL IDFFKSSINKHEDWKNFNFKFSNTDKYEDLSGFYREVEQGGYKITFR NISKEYVDKLVEEGKIYLFQIYNKDFSKYSKGTPTNMHTLYWKALFDE DNLKNVYKLNQGAEIFYRKGSIEKENIVIHKANNIAENKNMDNKKK QSKFEYDIKDRRYTVDKFQFHPITLNFKAIGNERINEQVNQYIKDN NIKHIIIGIDRGERHLLFLSLIDLKGNIIKQFSLNEIVNEYNGNSYKTNH MLEKREEERDKARKSWKTENIKELKEGYISQVIHKITQLMIEYNAIV VLEDLNFQFMRGRQKVEKQVYQKFEKMLIDKLNLYLVDKKDKNEA GLLKAHQLTNKFESFQKMGKQNGFLFYIPAWNTSKLPITGFVNL FDTHYTNVDNAKKFFENFEDIRFNEKKNYFEFIVNDYTKFNTKAEGT KLNWTICSNEDRIKTFRSSSKNNQWVSETVNLTDLSLIELFKYDIDYK LELKEQIISKSEKNFFETLLYLFKLTQMRNSITGTETDYLISPVADKTG NFFDSRKGIENLPNNADANGAYNIARKGLWVIEQIKKADLKKVKLA ISNKEWLQFVQGK
74	Cas12	MAKNTIFSQFTGLYPVSKTLRFELKPMGKTLEKIKETGVIENDKKRHN DYFDAKKIIDKYHKYFIDAALSKFPRIDWSPLKEAIERSLDRSDASKKKL EKTQTEFRKKIAKALTTHDHYKELTASTPKDLFLKVPDPHFGKQPAID TFDGSSYFTGFQENRQNIYSDEAISTAIPYRLVHDNFPKFLSNIEVYK TLKDNAPSVLSDAENELRDFLNGKSLANIFELNAYNEVLTQSGIDFFN QVIGGISDEGGEKKTRGINEFSNLYRQQHPEFAQKRLATKMIPLYKQ ILSDRETKSFILESYSNDSQVQNSVKEFFESQILNWDIAGRRVNLNE LTSLVKRISEFDLGNIVVNQEELSNISLKLFDNWNLSINGLLFKHAENRI GSAEKSANKKKIDAWMKNKEFSIATLNLAIASNSEEISRVKIESYWN NFEAKVQSILCGDNRRNLDEFISATFNENNALREDSKIIKLAFLDAL IEIMHSIKPLISDAENRDLFSYNELIPLYDQLSLVPLYNKIRNYATQKL TESEKFKLNFDNPTLADGWDQNKEEANTAIIILLKNGLYLIGIMNAK NPKPIKDFKTSESEDCYDKMVYKLLPGPNKMLPKVFFSEKGLATFKP PKDILDGYNAGKHKKGDLFDIGFCHQLIDFFKESIAKHPDWKKFDN FSDTSSYEDISGFYKEVTDQGYKITFSKIPTSQIDEWVKEGKLFQIY NKDFAPGAKGSPNLHTLYWKSVPENLKDVVVKLNGEAEFYRPS SVKKPYSHKVGEKLVNRIGKDGLPLPESVFGELFRYFNGKLEGELSDE AKRYLDVAVVKDVKHEIVKDRRYTQDKFEFHVPLTLNFKADSKNEY MNERVRHFLKDNPDVNIIGIDRGERHLLYMTLINQKGEILKQKSFNV VESVNYQAKLVQREKERDAARRSWSSVGKIKDLKEGFLSQVIHEITT TMIENNAIVVLEDLNFQFGRGRFCVERQVYQKFEKMLIDKLNLYLVFK

		NKPEGDVGGVLKGYQLAEKFDSFQKLGKQSGFLFYIPAAYSKIDPT TGFANLFNMTELTSAEKKKEFLSHFEDITYDGKNDRFLFSFDYKNFKC FQTDYIKKWTVYSQGKRIVYDKESKSAKEISPVEIIKAALAKQNIALTD QLDVLSAINSVEASPKSASFFGDICYAFEKTLQMRNSIPNTDEDYLAS PVMNKRGEFYDSRSCDDALPQNADANGAYHIALKGLYLIKNVFDA GGKELKISHEDWFKFAQSRNC
75	Cas12	MSKGKIWENFINQYSVSKTLRFELKPVGKTLENINAKGLIEEDEQRAE DYKKAKKIIDEYHKYFIEGALGSCSLDLNILNEFLQLYNKAQKTDADKK EYEKIQTTLRNIAESFGKNADKKTKEQYENLFKKELLRNLDLPDWVE DEEDAKIIFKFTFTTYFTGFHENRKNYDNEEKSTAIGYRIVHENLPK FIDNMNAFEKISKALDLSEIDRDFQSELGEIKAEFFTIEFFNQCLNQF GIDRYNTLLGGISEGENIKKKQGLNERINLYNQQLKGERKKERLPKLK VLYKQILSDSSSHSFSIDEFENDNELLESLEIFYKNELIGFNHSGVDSNI FDLVKDLLLKIDESEQSSIYLNKNDKGLTEISQRIFGDWNIKSALEEYD EHYPPKDDTFNKKELDESRWLKENHSIGVIEKALANYENEIVREHLK QNSAPIVSYFKSLEVDGENLIDKIYSAYGNISDLLNSSYPDEKKLVSDR TSKD KIKVFLDSLMSLLHFLKPLDVKDLGNKDSAFYGDYDFIVEQLSK LVRLYNKTRNYLTRKPYSIEKIKLNFENSTLLAGWDVNKERDNNCVIF KRQDGDRELFYLGIMDKSHNKIFTKIEEAKSDDVYQKMNYKLLPGP NKMLPKVFFSKSIDFYAPGEELLKNYKNGTHKKGENFNLOHCHELI DFFKRSINKHEDWSQFNFKFSDTSEYEDTSFFFKEVSQQGYSITFKNI DRETIEKFVDEGLYLFQIYNKDFSPKSKGRPNLHTLYWKMLFDERN LANTVYQLNGEAEVYRKSISEKDRVVHRADEPIGLKNSENSAQKS LFPYDIVKDRRFTVDKFQFHVPIITLNFKSEGNERLNISVNKFLKDNPD VNIIGLDRGERHLYLTINQKGEILHQESLNEVMGVNYQQKLHRVE KDRTEERRNWDRIENIKELKSGYLSQVVKISQLMVEYNAIVVMEDL NFGFKRGRIKVEKQVYQKFEKTLIDKLNLYVFKDREPEEPAGVLNAL QLTNKFESFKKLGKQCGFLFYVTSDYTSKIDPATGFVNLLYPKYESVEK SQNFFRKFDFNICFNSGAGYFEFDFDYSNFTDRADGTRTRWKVCTVG NERFGYNPKTKASETVNVTESLKELLQHEIAFENGESLVESISKNTTK YFHKSLLNFLRLTLRLHRSKTGTDIDYILSPVANEEGVFFDSRNASDK MPKDADANGAYNVALKGLMVLERINAAEDLSQFKFKDMSIKNKD WLKVVQDRQG
76	Cas12	MKNLANFTNLYSLQKTLRFELKPIGKTLDWIHKDCLKQDEILAEDYKI VKKIIDRYHKDFIDLAFESAYLQKKSSDSFTAIMEASIQSYSELYFIKEKS DRDKKAMEEISGIMRKEIVECFTGKYSEVKKKFGNLFKKELIKEDLL NFCEPDELPIIQKFADFTTYFTGFHENRENMYSNEEKATAIANRLIRE

		NLPRYLDNLRIRSIQGRYKDFGWKDLESNLKRIDKNLQYSDFLTENG FVYTFQKIDRYNLILGGQSVESGEKIQLNELINLYRQKNQLDRR QLPNLKELYKQILSDRTRHSFVPEKFSSDKALLRSLDFHKEVIQKNL FEEKQVSLQAIRETLDLKSFDLDRIYLTNDTSLTQISNFVFGDWSKV KTI LAIYFDENIANPKDRQRQSN SYLKAKENWLKKNYYSIHLENAIS VYGKHSDEELPNTKIEDYFSGLQTKDETKKPIDVLDAIVSKYADLESLL TKEYPEDKNLKS DKGSI EKIKNYLD SIKLLQNFLKPLKPKKVQDEKDLG FYNDLELYLESLESANSLYNKVRNYLTGKEYSDEKIKLNFKNSTLLDG WDENKETSNSLVIFRDTNNYYLGILDKQNNRIFESIEIQSGEETIQK MVYKLLPGANNMLPKVFFSEKGLLKFNPSDEITSLYSEGRFKKGDKF SINSLHTLIDFYKKS LAVHEDWSVFNFKFDETSHYEDISQFYRQVESQ GYKITFKPISKYIDTLVEDGKLYLFQIYNKDFSQNKKGKGNLHTIY FKSLFEKENLKD VIVKLNQAEVFFRKKS IHYDENITRYGHHSELLKG RFSYPILKDKRFTEDKFQFHPITLNFKS GEIKQFNARVNSYLKHND VKIIGIDRGERHLLYLSLIDQDGKILRQESLNLIKNDQNFKAINYQEKL HKKEIERDQARKSWGSIENIKELKEGYLSQVVHTISKLMVEHNAIVVL EDLNF GFKRGRQKVERQVYQFEKMLIEKLNFLVFKDKEMDEPGGI LKAYQLTDNFVSFEKMGKQTGFVYVPAWNTSKIDPKTGFVNFLHL NYENVNQA KELIGKFDQIRYNQDRDWF EFQVTTDQFFTENAPDT RTWII CSTPTKRFYSKRTVNGSVSTIEIDVNQKLKELFND CNYQDGED LVDRILEKDSKDFFSKLIAYLRILTSLRQNNGEQGF EERDFILSPVVG DGKFFNSLDASSQEPKDADANGAYHIALKGLMNLHVINETDDESLG KPSWKISNKDWLNFVWQRPSLKA
77	Cas12	MNLIENETKSEEIKSKLDSIMEIMHWTKMFIIEEIEKDVNFYNEIEI YDELQPLVTIYNRIRNYVTQKPYSEEKIKLNFGIPTLANGWSKTKEYD NNAIIMIRDGKYYL GIFNAKNKPKKIMEGHQSEENG DYKKMIYRLL PGPKNMLPKVFMSKTGIAEYKPSQYILECYEQNKHIKSDKNFDIKFCR DLIDFFKTSINRHPEWSKFNFKFSETSEYEDISTFYREVEKQGYKIEWT YISEKEIKELDENGQLYLFQIYNKDFSEKSKGKENLHTMYLKNLFSEEN LKNIVLKLNGEAEVFFRKSSIKKPIIHKKGSVLVNKTYNENGERKSIPEE QYTEIYKYLNSIGTNELSEKSKLMEEGKVEYYKANYDIVKDYRYSVD KFFIHLPM TINFKAAGFSPINNIALKSIALKEDMHII GIDRGERNLIYVS VIDTKGNIVEQRNFNIVNGIDYKEKLKQKELDRDNARKNWKEIGKIK DLKEGYLSLVVHEIAKL VVKYNAITMEDLNQGFKRGRFKVERQVYQ KFETMLINKLNYLVDKDLAVDQEGGLLRGYQLTYIPESLKVLRQCG YIFYVPVAYTSKIDPTTG FVAIFNYKGMTDKDFVTSFDSIKYDDERGLF AFEFDYENFVTHKVEMARNKWT VYTYGERIKRKFKNGLWDTAEKV DLTYQMRSILEKEYEIEYNKGQDILEQIEELDEKAQNGICKEIKYLVKDI VQMRNSLPDNAV EYDAISPVINNNGEFFDSTRGDEDKPLDADAN

		GAYCIALKGLYEVQMJKKNWNEETEFPRKELKIRHQDWDFIQNKR YL
78	Cas12	MENRYQVLQGLTAAQKAAAAAkkRSSFSIVELNAATRSRVPDEKY VPVQNYFSAMGKVC SQGEPKRENFVTRICAAYQELEYIPSIRKSLLO EKRATELIKNYLDAVNDLLRFIKPLLGRGNETDKDANFYGEFSFLTDC LFAIVPLYNEVRNYLTQKPSTEFKLNFRGSTLLNGWDKNKERDNL GVILRKEGKYFLAIMNKKHNTLFTGKLLQHTGGECYQKMEYKLIPG SKMLPKVFFSKKGISTFQPSEELLLNYRIGTYKKGEKFNLEHLHLIDFY KHSIAVHEDWSKFDHFSDTSSYRDISGFYKEVEQQGYKLTRNVSV SYINRLVEEGKLYLFQIYNKDFSEYSGTTPNLHTLYWKMLFDPENLKD VVYKLSGEAEVFFRKKSLDVSHPTHPKNEPIEKKNNINNGEKSLSFYD LIKDRRFTVDKFQFHPITMNFKEQGDVNQMVQSYVRNNKGL NVIGIDRGERNLLYLVVINEHGEILEQFSLNEIRNAYNGKEHKIDYHTL LEERSKKRQDARQSWQTIEGIDKLTGYLSQVIHVITQLMVKYNAIV VLEDLNFGEKSSRQKFEQSVYQQFERKLIDKLNFLVNKKAAPNEVGG LLNAYQLTAPLGNRKMKGKQNGFLFYVPAWHTSKIDPRTGFVNLLD TRYENVAKAKEFFAKFASITYNPEKKWFEAFDYKAFGNRADGSRTK WTICSYGERIETFRNPENNNQWDTKSVPLTERLTEFSKYGIDYTTNL KEQILNQTDKAFFVELLGALRLTLQLRNSRKSTGEDFLFSPVADENG CFFDSREANDNEPKDADANGAYHIALKGLWVLDITRNTTEEGKNPKLA ITNKEWLSFAQAKPFAHE
79	Cas12	MSDSYDELTKAQKEKQEKRKHVALTEVVAALEKYTIALDNGHEHKN AVNTFKNYFQNYFFHFDTDKKKTAKTLDCCIKDEYNGLKGILNTPW DKNKKLQDQKLVQQKSFLDSIQELLWFIKPLVLTNDTLEKDERFYG EFMPLYDEISNIIKLYNKIRNYLTKKPYSIEKYKLNFEENGSLSGWDVN KEKDNTSVLLCKDNQYYLAIMHIDHNKVFELDELIKHAGKGQKINY KLLPGANKMLPKVFFSGKNISYYDPSKEILKIRNYGTHTKNGDPQPG FSKRDFSVDCCRKMIDFFKNSIAKHEDWKNFDFKFQPTKNYNSIDEF YREVEEQGYKITYSNVSEDIYDSLVEYGKIYLFHIYNKDFSDKRDESKK HTDNMHTLYWKALFDAKNLKD VVYKLNGEAEIFYRKKSIDIKKPTHE KGKPIDNKNPNARKKTSVKYDLIKDKRFTVDKFFFHVPITLNFKSKS GYLSNDDVNAAIKKNNDIKIIGLDRGERNLIYLSLINSKGEIAYQESLN VVSTDKGFDVNYHKLLDDKEGNRDEARKNWDKIENIKELKAGYLSQ VIHKIAKLMIDNNAIVVMEDLNFGEKGRGKVEKQIYQKFEKMLIDK LNYLVFKNVHPEQAGGLYKAYQLTAQFESFKLGKQSGFLFYIPAW NTSKIDPTAGFVDFLKPRYESVTQAKSFLQRFDKINYNKTKDYFEFAF DYKNFTDKANDTKTDWVVCYGTERTYDYDVRTKTTQKIDITAEKKL

		LEKSEINYLNGKDIKELIIAVDSKEFHSAALLKYLAIVLALRYSDSQSGRD FILSPVANEQGHFFNSDKTDDTLPKDADANGAYHIALKGLWAINQI RKTNGDKLKLITISNKDWLNFVQKKEYRKGV
80	Cas12	MQTLFENFTNQYPVSKTLRFELIPQGKTKDFIEQKGLKKDEDRAEK YKKVKNIIDEYHKDFIEKSLNGLKLDGLEKYKTLYLKQEKDDKDKKAFD KEKENLRKQIANAFRNNEKFKTLFAKELIKNDLMSFACEEDKKNVKE FEAFTTYFTGFHQNRANMYVADEKRTAIAASRLIHENLPKFDNIKIFEK MKKEAPELLSPFNQTLKDMKDVIGKTTLEEIFSLDYFNKTLTQSGIDIY NSVIGGRTPPEGKTKIKGLNEYINTDFNQKQTDKKRQPKFKQLYKQ ILSDRQSLSFIAEAFKNDAEILEAIEKFYVNELLHFSNEGKSTNVLDIAK NAVSNLESFNLTKMYFRSGTSLTDVSRKVFGIEWSIINRALDNYATT YPIKPREKSEKYEERKEKWLKQDFNVRLIQTIDEYDNETVKGKNSG KVIADYFAKFCDDKETDLIQVNEGYIAVKDLLNTPYPENEEKIGSNKD QVKQIKAFMDSIMDIMHFVRPLSLKDTDEKDETFYSFLTPLYDHLT QTIALYNKVRNYLTQKPYSTEKIKLNFENSTLLGGWDLNKETDNTAI LRKDNLYLGLMDKRHNRIFRNVPKADKKDFCYEKMVYKLLPGANK MLPKVFFSQSRIQEFTPSAKLLENYANETHKKGDNFNLNHCHKLIDF FKDSINKHEDWKNFDFRFSATSTYADLSGFYHEVEHQGYKISFQSA DSFIDDLVNEGKLYLFQIYNKDFSPFSKGKPNLHTLYWKMLFDENNL KDVVYKLNGEAEVYRKKSAEKNTTIHKANESIINKNPDNPKATSTF NYDIVKDKRYTIDKFQFHIPITMNFKAEGIFNMNQVRVNFQKANPDI NIIGIDRGERHLLYYALINQKGKILKQDTLNVIANEKQKVVDYHNLDDK KEGDRATARQEWGVIETIKELKEGYLSQVIHKLTDLMIENNIAIVME DLNFGFKRGRQKVEKQVYQKFEKMLIDKLNLYVDKNKKANELGGLL NAFQLANKFESFQKMGKQNGFIFYPAWNTSKTDPATGFIDFLKPR YENLNQAKDFFEKFDSIRLNSKADYFEFAFNFKNFTEKADGGRTKWT VCTTNEDRYAWNRRALNNNRGSQEKYDITAEKSLFDGKVDYKSGK DLKQQIASQESADFFKALMKNLSITLSLRHNNGEKGDNEQDYILSPV ADSKGRFFDSRKADDDMPKNADANGAYHIALKGLWCLEQISKTD LKKVKLAISNKEWLEFVQTLKG
81	Cas12	MQLTDNLSDKYKEAAPLLNENYSNEKGLKNDDKSISLIKNFLDAIKEI EKFIKPLSETNITGEKNDLFYSQFTPLLDNISRIDILYDKVRNYVTQKPF STDKIKLNFNGSQLLNGWDRNKEKDCGAVWLCKDEKYLAIDKSN NSILENIDFQDCDESDCYEKIYKLLPGPNKMLPKVFFSEKCKLLSPS DEILKIRKNGTFKKGDKFSLDDCHKLIDFYKESFKKYPNWLIYNFKFKK TNEYNDIREFYNDVASQGYNISKMKIPTSFIDKLVDGKIYLFQLYNK DFSPHSGTPNLHTLYFKMLFDERNLEDVVYKLNGEAEFMFYRPASIK

		YDKPTHKNTPIKNKNTLNDKKTSAFPYDLIKDKRYTKWQFSLHFPIT MNFKAPDRAMINDDVRNLLKSCNNFIIGIDRGERNLLYVSVIDSN GTIIYQHSLNIIGNKFKGKTYKTYREKLATREKDRTEQRRNWKAIESI KELKEGYISQAVHVICQLVVKYDAIIVMEKLTGFKRGRTKFEKQVYQ KFEKMLIDKLNYYVDKKLDPDEEGLLHAYQLTNKLESFDKLGTSQSG FIFYVRPDTSKIDPVTGFVNLLYPRYENIDKAKDMISRFDEIRYNAGE DFFFDIDYDKFKPTASDYRKKWTICTNGERIEAFRNPANNNEWSY RTIILAEKFELFDNNSINYRDSDDLKAEILSQTGKGFEDFFKLLRLTL QMRNSNPETGEDRILSPVKDKNGNFYDSSKYDEKSKLPDADANG AYNIARKGLWIVEQFKKADNVSTVEPVIHNDKWLKFVQENDMTNN
82	Cas12	MLPNEKERNEFKNSNAKQYIREISNIITDTETAHLEYDEHISLIESEEKA DEMKKRLDMYMNMYHWAKAFIVDEVLDREMFYSIDIDDIYNILE NIVPLYNRVRNYVTQKPYNSKKIKLNFQSPTLANGWSQSKEFDNNA IILIRDNKYYLAIFNAKNKPKDKIIQGNSDKKNDNDYKKMVYNLLPGA NKMLPKVFLSKKGIETFKPSDYIISGYNAHKHIKTSENFDISFCRDLIDY FKNSIEKHAEWRYEFKFSATDSYNDISEFYREVEMQGYRIDWTYISE ADINKLDEEGKIYLFQIYNKDFAEINSTGKENLHTMYFKNIFSEENLKDI IIKLNGQAEFYRRASVKNPVKHKKDSVLVNKTYKNQLDNGDVVRIP IPDDIYNEIYKMYNGYIKENDLSEAAKEYLDKVEVRTAQKDIVKDORY TVDKYFIHTPITINYKVTARNNVNDMAVKYIAQNDDIHVIGIDRGER NLIYISVIDSHGNIVKQKSYNINLNNYDYKKKLVEKEKTREYARKNWKSI GNIKELKEGYISGVVHEIAMLMVEYNAIIMEDLNYGFKRGRFKVER QVYQKFESMLINKLNYFASKGKSVDEPGGLLKGYQLTYVPDNIKNLG KQCGVIFYVPAAFSTKIDPSTGFISAFNFKSISTNASRKQFFMQFDEIR YCAEKDMFSFGFDYNNFDTYNITMSKTQWTVYTNGERLQSEFNNA RRTGKTKSINLTETIKLLLEDNEINYADGHVDRIDMEKMDKEDKNSEF FAQLLSLYKLTVMRNSYTEAEQEKGISYDKIISPVINDEGEFFDSD NYKESDDKECKMPKDADANGAYCIAKGLYEVKIKSEWTEDEGFD NCLKLPHAEWLDFIQNKRYE
83	Cas12	MSNLYSNLHNLVPVQKTLRFELKPQGKTENMEKAGILKADEHRAE VYGKVKKYCDEYHKTFIDRCLSNIELNEIDKYELYINNRRDDKQKEEL DQLETGLRKQISDAFKKSAEYKGLFQKDMITSYLVMTYKENQEKMQ DIGEFNRFTTYFTGYNKNRENMYSEEDKSTASYRLINENLPTFDNIK IYKKIVSLMPENIEKIYKDL EEYIQVNSVDEIFNISYNDVLTQRGIECY NILISGRTKNDGDGIKGLNEYINEFNQTHNEIKPKLQELYKQILSDAES ASFKVDIENDKELLNIEVYYANILPTLNKIEDLFTRISNYNLELILVNN DGSLSLTSNMVFNEWSYIKGIISQKYDAEYSGKEKYGTEKYAQKKQE

		YLKKQKIYSLKFLNDCIGNNAICEYLKNYIIQNKNIETIKEDYNEVQNIK AEDDTKELIKDEKSIEKIKFLDDVKSLEFVKLVIPKDRTEKDAKFYS ELTPYEEKIKEIPLYNKVRNYVTQKPYSTEKIKLNFECPTLLNGWDAN KEEANLGVILLKEGKYLLGIMNPYCKKIFEVYEKDSNEQNNYKKMEY KLLPGPNKMLPKVFFSNSRIEFNPSKELQEKYNKGYHKKGKDFDIN FCHELIDFYKQSLNKHEDWKKFNFKFKDTSEYNDISEFYREVEEQGY KIEYTEYSEKYNELVDRGELYLFQIYNKDFSEYSGKENLHTLYWKAV FDPDNIMNPVYKLNNGNAEIFYRKKSLEMKVTHPANQPIANKNISTIE AGRSTSTFKYDLIKDKRYTMDKFQFHPITVNFKSERLFNINQIVNKY LKYNDIHHVIGIDRGERNLLYVCIDKNEKIVYQKSLNEIVSEYNNNR YTDDYHGLDRKEKEREIAREDWKNENIKELKEGYMSQIIHILVELM KKYNAIIVIEDLNKGFKNSRIKVEKQVYQKFEKMFIDKLNLYLFKDED KMDEGGVLNAYQLTNKFESFTKLKGQSGILYYIPAWCTSKIDPTTGF NRYLKYENFDKSKEFVNRIDDIRYNEKENLFEFDIDYSKFTDRLNDTK NKWTLCSYGERILTQKNANGWFDRRIQLSIEFKNLFEKYVINLNNIK DSILKLDKDNIEFYKNGENLGFILFKLMVQMRNSLTGKEEDNLIS PVKNQHGKFFNTSERVEGLPIDADANGAYNIARKGFMLVEQMKNV EDEKLNKIKYNITEKEWLNYYVQNRGMWWKRQYLYHI
84	Cas12	MAKNTIFSQFTGLYPVSKTLRFELKPMGKTLEKIKETGVIENDKKRHN DYFDAKKIIDKYHKYFIDAALSKFPRIDWSPLKEAIERSLDRSDASKKKL EKTQTEFRKKIAKALTTHDHYKELTASTPKDLFLKVPDPHFGKQPAID TFDGSSYFTGFQENRQNIYSDEAISTAIPYRLVHDNFPKFLSNIEVYK TLKDNAPSVLSDAENELRDFLNGKSLANIFELNAYNEVLTQSGIDFFN QVIGGISDEGGEKKTRGINEFSNLYRQQHPEFAQKRLATKMIPLYKQ ILSDRETKSFILESYSNDSQVQNSVKEFFESQILNWDIAGRRVNVLNE LTSLVKRISEFDLGNIVVNQEELSNISLKLFDNWNINSINGLLFKHAENRI GSAEKSANKKKIDAWMKNKEFSIATLNLAIAESNSEEISRVKIESYWN NFEAKVQSILCGDNRRNLDEFISATFNENNALREDSKIIKLAFLDAL IEIMHSIKPLISDAENRDLFSYNELIPLYDQLSLVVPLYNKIRNYATQKL TESEKFLNFDNPTLADGWDQNKEEANTAIIILLKNGLYLGIMNAK NKPKIKDFKTSESEDCYDKMVYKLLPGPNKMLPKVFFSEKGLATFKP PKDILDGYNAGKHKKGDLFDIGFCHQLIDFFKESIAKHPDWKKFDN FSDTSSYEDISGFYKEVTDQGYKITFSKIPTSQIDWVKEGKFLFQIY NKDFAPGAKGSPNLHTLYWKSVPENLKDVVVKLNGEAEFYRPS SVKKPYSHKVGEKLVNRIGKDGLPLPESVFGELFRYFNGKLEGELSDE AKRYLDVAVVKDVKEIVKDRRYTQDKFEFHVPLTLNFKADSKNEY MNERVRHFLKDNPDVNIIGIDRGERHLLYMTLINQKGEILKQKSFNV VESVNYQAKLVQREKERDAARRSWSSVGKIKDLKEGFLSQVIHEITT TMIENNAIVVLEDLNFQFKRGRFCVERQVYQKFEKMLIDKLNLYLVFK NKPEGDVGGVLKGYQLAEKFDQKLGKQSGFLFYIPAAYSKIDPT

		TGFANLFNMTELTSAEKKKEFLSHFEDITYDGKNDRFLFSFDYKNFKC FQTDYIKKWTVYSQGKRIVYDKESKSAKEISPVETIIKAALAKQNIALTD QLDVLSAINSVEASPKSASFFGDICYAFEKTLQMRNSIPNTDEDYLAS PVMNKRGEFYDSRSCDDALPQNADANGAYHIALKGLYLIKNVFDA GGKELKISHEDWFKFAQSRNC
85	Cas12	MYKDKTDKTKIIDSLLIKFINIAESTQLDSMSQDEAKELVKEFWGFTT YFVGFDNRKNMYTAEKSTGIAYRLVNENLPKFIDNMEAFKKAIAIR PEIQANMEELYSDFSEYLNVESVQEMFQLDYNNMLLTQKQIDVYNA IIGGKTDDHVDVKKIGINEYINLYNQHKDDKLPKLKALFKQILSDRN AISWLPEEFNGDQEVNLNAIKDCYERLSENVLGDKVLKSLGSLSDYSL DGIFIRNDLQLTDISQKMFGNWCVIQNAIMQNIKHVAPARKHKESE EDYEKRIAGIFKKVDSFSISFINDCLNEADPNNAFYFENYFATFGAVN TPTMQRENLFALVQNAYTEVAALLHSDYPTAKHLAQDKVNVAKIKA LLDAIKSLQHFKVPLLGGKDESDKDERFYGELASLWAELEDTVTPLYN MIRNYMTRKPYSQKKIKLNFENPQLLGGWDANKEKDYATIILRRDG LYYLAIMNKESKLLGKAMPDGECEYKEMVYKLLPGANKMLPKVFF AKSRMEDFKPSKELVEKYNNGTHKKGNFNIQDCHNLIDYFKQSISK HEDWKGKGFNFSDTSTYEDLSGFYREVEQQGYKLSFARVSVSYISQL VEEGKMYLFQIYNKDFSEYSKGTPTNMHTLYWKALFDERNLADVYK LNGQAEMFYRKSIENHTPHHPANHPILNKNKDNKKESLFDYDLIK DRRYTVDKFMFHPITMNFKSSGSEINQDVKAYLRHADDMMHIGI DRGERHLLYLVIDLQNIKEQYSLNEIVNEYNGNTYHTNYHDLDDV CEEERLKARQSWQTIENIKELKEGYLSQVIHKITQLMVKYHAIVVLED LNMGMFRGRQKVEKQVYQKFEKMLIDKLNLYLVDKKADASVSGGLL NAYQLTSKFDSFQKLKGQSGFLFYIPAWNTSKIDPVTGTVNLLDTRY QNVEKAKVFFSKFDAIRYNKDKDWFEFNLDYDKFGKKAEGTRTKW ALCTRGMRIDTFRNKEKNSQWDNQEVDLTAEMKSLEHYIIDIHG NLKDAISAQTDKAFFTGLLHILKLTQMRNSITGTETDYLSPVADEN GIFYDSRSCGDELPENADANGAYNIARKGLMMIEQIKDAKDLNLK FDSNKSXLNFAQQKPYKNE
86	Cas12	MNEADPNNAFYFENYFATFGAVNTPTMQRENLFALVNLAYTEVAS LLHSYYPAEKNLAQDKANVAKIKALLDAIKSLQHFKVPLLGGKDESDK DERFYGELASLWAELETVTPLYNMIRNYMTRKPYSQKKIKLNFENPQ LLGGWDANKEKDYATIILRRNGLYYLAIMDKDSRLLGKAMPDGE CEYKEMVYKLLPGANKMLPKVFFAKSRMEDFKPSKELVEKYNNGTHK KGKNFNIQDCHNLIDYFKQSISKHEDWKGKGFNFSDTSTYEDLSGFY REVEQQGYKLSFARVSVSYISQLVEEGKMYLFQIYNKDFSEYSKGTPT

		NMHTLYWKALFDERNLADVYKLNQAEMFYRKKSIENTHPTHPA THPILNKNKDNKKKESLFEYDLIKDRRYTVDKFMFHVPIITMNFKSVG SENINQGVKEYLHHADDMMHIIIGDRGERHLLYLVIDLQGNIEQYSL NEIVNEYNGNTYHTNYHDLLDAREDERLKRQSWQTIENIKELKEGY LSQVIHKITQLMVKYHAIVVLEDLNMGMGRGRQKVEKQVYQKFEK MLIDKLNLYVDKKADASVSGLLNAYQLTSKFDSFQKLGKQSGFLFYI PAWNTSKIDPVTGFVNLLDARYQNVEKAKAFFSKFDAIRYNKDKD WFEFNLDYDKFGKKAEGTRTKWTLCTRGMRIDTFRNKEKNSQWD NQEVDLTAELKSLEHYIIDIHGNLKEAISTQTDKAFFTGLLHILKLTLO MRNSITGTETDYLVSADENGIFYDSRTCGDEL PENADANGAYNI ARKGLMMIEQIKNAEDLGNLKFDISNKAWLNFAQQKPYKNG
87	Cas12	MDNNNLHAVDGYFATLGAVNTPTMQRENLFALIQNAYTDISDLLD TPYPENKNLAQDKTNVAKVKALLDAIKSLQHFVKPLLGMGDESDKD ERFYGELASLWTELDVTPLYNMIRNYMTRKPYSEKKIKLN FENPQL LGGWDANKEKDYATIILRRNGMYLAIMDKDSKLLGKTMPSDGE CYEKMVYKLLPGANKMLPKVFFAKSRINDFKPSKKIVENYNNGTHKK GKNFNINDCHDLIDYFKQSIDKHEDWSKFGFNFSDTSTYEDLSGFYR EVEQQGYKLSFTNISVSFIDKLVDGKMYLFQIYNKDFS DYSGTPN MHTLYWKALFDERNLADVYKLNGEAEMFYRKKSINNTHTPHHAN HPIQNKKNKDNKKKESVFEYDLVKDRRYTEDKFLFHVPIITMNFNSVG AENINQQVRKYLQQADDTTHIIGDRGERHLLYLVIDMQGNIKEQFS LNEIVNEYNGNTYRTNYHDLLDV RADKRLKASQSWQTIENIKELKEG YLSQAIHKITQLMVKYHVVVLEDLNKGFMGRGRQKVEKQVYQKFEK MLIDKLNLYVDKHKDANETGGLLHALQLTSEFKNFKKSEYQNGFLFY IPAWNTSKIDPVTGFVNRFDTRYTNAVEAQKFFRKDFEIRYNEEKD WFEFEFDYDKFTQKAHGTRTRWTLCTHGKRLRSFRNPAKQYNWDS EVVALTDEFKRILGEAGIDIHENLKDAISNLEGKRRKYLEPLMQFMKL LLQLRNSRKNPEEDYILSPVADENG VFYDSRSCGDKLPENADANGA YNIARKGLMLIRQIKEAKELGKVKYDISNKAWLNFAQQKPYKNE
88	Cas12	MQKKA FEENQQNLRSHIAKKLTEDKAYANLFGKNLLESYKDKTDKTKI IDSDLIK FINTAESTQLDSMSQDEAKEIVKEFWGFTTYFVGFFDNRK NMYTAEKSTGIAYRLINENLPKFIDNMEAFKKAIARPEIQADMEELY SNFSEYLNVESIQEMFLDYNNMLLTQKQIDVYNAIIGGKTDD EHDV KIKGINEYINLYNQHKDDKLPKLFKQILSDRNAISWLPEEFNSD QEV LNAIKDCYERLSENVLGDKVLKSMGLSLADYSLDGIFIRNDLQLT DISQKMFGNWSVIQNAIMQNIKHVAPARKHKESEEEYENRIAGIFK KADSFSISYIDACLNETDPNNAYFVENYFATLGAVDTPTMQRENLFA

		LVQNAYTEITALLHSDYPTEKNLAQDKANVAKIKALLDAIKSLQHFVK PLLGKGDESDKDERFYGELASLWAELOMTPLYNMIRNYMTRKPYS QKKIKLNFENPQLLGGWDANKEKDYATIILRRNGLYLAIMNKDSKK LLGKAMPDGECEYKEMVYKLLPGANKMLPKVFFAKSRMEDFKPSK ELVEKYNNGTHKKGKNFNIQDCHNLIDYFKQSIDKHEDWSKFGKF SDTSTYEDLSGFYREVEQQGYKLSFARVSVSYINQLVEEGKMYLFQIY NKDFSEYSKGTPTNMHTLYWKALFDERNLADVYKLNQGAEMFYRK KSIENHTPTHPANHPILNKNKDNKKKESLFEYDLIKDRRYTVDKFMF HVPITMNFKSVGSEINQDVKAYLRHADDMMHIGIDRGERHLLYLVV IDLQGNIEQFSLNEIVNDYNGNTYHTNYHDLVDREDERLKARQS WQTENIKELKEGYLSQVIHKITQLMVKYHAIWLEDLNMGMFRGR QKVEKQVYQKFEKMLIEKLNLYVDKKADASVSGGLLNAYQLTSKFDS FQKLKQSGFLFYIPAWNTSKIDPITGFVNLLDTRYQNVKAKAFFSK FDAIRYNKDKEWFEFDLDYDKFGRKAEGTRTKWTLCTGRMRIDTFR NKEKNSQWDNQEIDLTAEKMSLLEHYIDIQGNLKEAICTQTDKAF TGLLHILKLTLMRNSITGTQTDYLVSPVADENGIFYDSRSCGDSLPE NADANGAYNIARKGLMLIEKIKNAEDLTIKFDISNKAWLNFAQQK PYKNG
89	Cas12	MLENEQEAEEKIKNKLDDIMNIYHWIKIFLVDEEIEKDMDFYSEIEDIY EELSPLVSLYNRVRYVTQKPYSQEKMKLNFGSPTLADGWSKSKEFS NNAIIMLKDGKYYIGIFNIRNKPNEKIEGRNNRINDSDYKKMVYRLL PGANKMLPKVMFSSKKGIEYNNPSQYILSGYNSKKHIKSNENFDINFC HDLIDFFKESINKNEEWKNFDFKFSDESYNIDSEFYREVEQQGYKIE WVYISEQDIEQLEKNGQLYIFQIYNKDFAKKSIGNKNLHTMYLENLFS EENLKDVVLKLNGEAEIFFRKSSIKKPIVHKAGSILVNKCIEDETGNKV SFPDDIYNEIYQYMNGMTDVLSERAQNYEYKVKHSVSKQDIVKDYR YTVDKYFIHLPITINFKASSFMPINDIALKYIAKRDDIHIGIDRGERNLI YVSVIDLQGNIVYQKNYNVNGYDYKAKLRETEIQRDNARKNWKEI GKIKQLKEGYLSLVVHEIAQLIVKYNAIVVMEDLNMGFGRGRFKVER QVYQKFENMLINKLNLYVDKNKKVDEDGGLLRGYQLTYVPGQKEH VGKQCGFIFYVPAAYTSKIDPTTGFVSIFNNKVNKEFVTKFDSIKYN KNMKNMFKFDYNNFETYNITLAKSKWTIYTNIGIRLKREYNNGRWN KITEVDLTKEMANTLKKYDIEFENNIEILKSISQLDEKNQRNICNEIKEI IKLIVQLRNSMPDNGSKDNEYDKIISPVLNENNYFYDSSEVCDNSAP ENADANGAYCIAMKGLYQVIQIKENWSQDSNPKNILGIKHYEWF FMQNKRYL

90	Cas12	MAKNTIFTQFTGLYPVSKTLRFELKPMGKTLKIKETGVIENDKKRHN DYFDAKKIIDKYHKYFIDAALSKEFSRIDWNPLKEAIEGSLDRSDASKKK LEKTQTEFRKKIAKALTTDHYKELTASTPKDLFLKVFPDHFQKQPAI DTFDGFSSYFTGFQENRQNIYSDEAISTAIPYRLVHDNFPKFLSNIEVY KTLKDNAPSVLSDAENELKDFLNGKPLANIFELNAYNDVLTQSGIDFF NQVIGGISGEGGEKTRGINEFSNLYRQQHPEFAQKRLATKMIPLYK QILSDRETKSFILESYSTDSQVQESVKEFFESQILNCIAGRKNVNLNE LTSLIKRIAEDLGSIIYINQEELSNISLELFKSWNTINAVLFKNAENRIGS AEKAANKKKIDAWMKSNEFSIATLNLIAESDSEEISRVKIESYWNDF EAKVQSILCGDNRRNLDEFSLATFNENNALREDSEIIGKLKAFDLALIE IMHSIKPLISDAENRDLSEYNELMPLYDQLSLVPLYNKIRNYATQKL TESEKFKLNFDNPTLADGWDQNKEDANTAILLLKNGLYLIGIMNAK NPKPIKDKTSESEDCYDKMVYKLLPGPNKMLPKVFFSEKGLATFKP PKDILDGYNAGKHKKGDLFDIGFCHQLIDFFKESIAKHPDWKKFDFK FSDTSSYEDISGFYKEVTDQGYKITFSKIPTSQIDWVNEGKLFQIY NKDFAPGAKGSPNLHTLYWKSVPENLKDVVVKLNGEAEFYRPS SVKKPYSHKVGEKLVNRIGKDGLPLPESVFGELFRYFNGKLDGELSDE AKRYLDVAVVKDVKHEIVKDRRYTQDKFEFHVPLTLNFKADSKNEY MNERVRHFLKDNPDVNIIGIDRGERHLLYMTLINQKGEILKQKSFNI VESVNYQAKLVQREKERDAARKSWSSVGKIKDLKEGFLSQVIHEITT TMIENNAIVVLEDLNFQFKRGRFCVERQVYQFEKMLIDKLNLYLVFK NKPEGDVGGVLKGYQLAEKFDSEFQKLGKQSGFLFYIPAAYSKIDPT TGFANLNMTELTAEEKKDFLSHFDDITYDGKNDRFLFGFDYKNFK CFQTDFIKKWTVYTQGKRIVYDKESKSAKEIFPVEIKAALAKQNIALT DQLDVLASINSVEASPKSASFFGNICYAFEKTLQMRNSIPNTDEDYLV SPVMNKRGEFYDSRSCDDALPQNADANGAYHIALKGLYLIKNVFDA GGKDLKISHEDWFKFAQSRNC
91	Cas12	MRPVLQLTDTEDKLSQNKPAVGKIKALLDAFKDLQHFIKPLLGSGEE NEKDELFYGAFQLIWDELDTVTPLYNKVRNWLTRKPYSTEKIKLNFD NAQLLGGWDVNKEPDCTGVLLRKDGFYYLGIMNKKSNRIFDADVT PADGICYEKIDYKLLPGANKMLPKVFFSKSRIDEFAPSEAILSSYKRG HKKGADFSLSDCHRLIDFFKASINKHEDWSKFGFQFSDTKTYEDISGF YREVEQQGYMLSSHQVSEAYINQMVEEGKLFRIWNKDFSEYSKG TPNMHTLYWRMLFDERNLADVVKLNGQAEVFYRKASIKAEQIM HPAHHPIENKNTLNEKRSSTFDYDLVKDRRYTVDKFQFHPITINFKA IGQTNVNPVHETIRRGFTHVIGIDRGERHLLYLSLIDLGKHIKQVQ TLNEIINEYNGLAHKTNYDLLVKREGERTTARRSWDTIENIKELKEG YLSQVIHIISKMMVEYNAIVVLEDLNMGMGRGRQKIERQVYEKFEK MLIDKLNCYIDKQADSQSEGGLLHPIQLANKFESFRKLKQSGCLFYI PAWNTSKIDPVTGFVNLFDTTRYETREKAKLFFSHFQRICFNAEKDWF

		EFSDYNDFTTKAEGTRTQWTLCSYGTRIRNFRNPLQNHQWDDEEI VLTEAFKALFDKYDIDIHANLKEAINAQTDAAQFFKDLMLMKLLQ MRNSKTNSEVDYLLSPVADEHGRFFDSRAGAGSLPDNADANGAYN IARKGLWVIRKIQETPEGEKLSLAITNKEWLEFAQTKPYLND
92	Cas12	MNLNTYFSQFTGLYPVSKTLRFELKPMGKLEKIKETGIIENDKKRHN DYFDAKKIIDKYHKYFIDAALSKFPCIDWNPLKEAIERSLDRSDASKKK LEKTQTEFRKKIAKALTTGHYKELTASTPKDLFLKVFDPDFGKQPAI DTFDGFSYFTGFQENRQNIYSDEAISTAIPYRLVHDNFPKFLSNIEVY NILKDNAPSVLSDAENELKDFLNGKPLANIFELNAYNDVLTQSGIDFF NQVIGGFSGEGGEKTRGINEFSNLYRQQHPEFAQKRLATKMIPLYK QILSDRETKSFILESYSTDSQVQESVKEFFESQILNCDIAGRKNVNLKEL SSLIKRITEFDLGSIVNQEELSSISLELFKSWNTINAILFKNAENRIGSA EKAANKKKIDAWMKSNFESIATLNLAIAESDSEEISRVKIESYWNNFE AKVQSILCGDNRRNLDEFISATFNENNALREDSKVIEKLKAFDLALIEI MHSIKPLISDAENRDLSEYNELMPLYDQLSLVPLYNKIRNYATQKLT ESEKFLNFDNPTLADGWDQNKEEANTAILLLKNGLYYLIGIMNAKN KPKIKDFKTSESEDCYDKMVYKLLPGPNKMLPKVFFSEKGLATFKPPK DILDGYNAGKHKKGDLFDIGFCHQLIDFFKESIAKHPDWKKDFKFS DTSSYEDISGFYKEVTDQGYKITFSKIPTQIDWVNEGKLFQIYNK DFAPGAKGSPNLHTLYWKSVPENLKDVVVKLNGEAEFYRPSVVK KPYSHKVGEKLVNRIGKDGLPLPESVFGELFRYFNGKLDGELSDEAKR YLDVAVVKDKVHEIVKDRRYTQDKFEFHVPLTLNFKADSKNEYMNE RVRHFLKDNPDVNIIGIDRGERHLLYMTLINQKGEILKQKSFNIVESV NYQAKLVQREKERDTARRSWSSVGKIKDLKEGFLSQVIHEITTTMIE NNAIVVLEDLNFQFKRGRFCVERQVYQKFEKMLIDKLNLYLVFNKPE GDVGGVLKGYQLAEKFDQKLGKQSGFLFYIPAAYTSKIDPTTGFA NLFNMTELTSAEKKKEFLSHFEDITYDGKNDRFLFSFDYKKFKCFQTD YIKKWTVYSQGRIVYDKESKSAKISPVEIIKAALAKQNIALTDQLDV LSAINSVEASRETASFFGDICYAFEKTLQMRNSIPNTDEDYLVSPVM NKKGEFYDSRSCGDSLKPNADANGAYHIALKGLYLIKNVFDAGGKDL KISHEDWFKFAQSRNR
93	Cas12	MQTLFENFTNQYPVSKTLRFELIPQGKTKDFIEQKGLLKKDEDRAEK YKKVKNIIDEYHKDFIEKSLNGLKLDGLEEYKTLYLKQEKDDKDKAFD KEKENLRKQIANAFRNNEKFKTLFAKELIKNDLMSFACEEDKKNVKE FEAFTTYFTGFHQNRANMYVADEKRTAIASRLIHENLPKFIDNIKIFEK MKKEAPELLSPFNQTLKDMKDVIGKTTLEEIFSLDYFNKTLTQSGIDIY NSVIGGRTPEEGKTKIKGLNEYINTDFNQKQTDKKKRQPKFKQLYKQ

		ILSDRQSLSFIAEAFKNDTEILEAIEKFYVNELLHFSNEGKSTNVLDAIK NAVSNLESFNLTKIYFRSGTSLTDVSRKVFGEWSIINRALDNYATTY PIKPREKSEKYEERKEKWLKQDFNVSLIQTIDEYDNETVKGKNSGK VIVDYFAKFCDDKETDLIQKVNIEGYIAVKDLLNTPYPENEKLGSKND QVKQIKAFMDSIMDIMHFVRPLSLKDTDEKDETFYSLFTPLYDHLT QTIALYNKVRNYLTQKPYSTEKIKLNFENSTLLGGWDLNKETDNTAI LRKENLYYLIGIMDKRHNRIFRNVPKADKKDSCYEKMVYKLLPGANK MLPKVFFSQSRIQEFTPSAKLLENYENETHKKGDNFNLNHCHQLIDF FKDSINKHEDWKNFDFRFSATSTYADLSGFYHEVEHQGYKISFQSI DSFIDDLVNEGKLYLFQIYNKDFSPFSKGPKNLHTLYWKMLFDENNL KDVVYKLNGEAEVYRKKSAEKNNTTIHKANESIINKNPNKATSTF NYDIVKDKRYTIDKFQFHVPIITMNFKAEGIFNMNQVRNQFLKANPD INIIGIDRGERHLLYYTLINQKGKILKQDTLNVIANEKQKVVDYHNLLDK KEGDRATARQEWGVIETIKELKEGYLSQVIHKLTDLMIENNAIIVME DLNFGFKRGRQKVEKQVYQKFEKMLIDKLNLYVDKNKKANELGGLL NAFQLANKFESFQKMGKQNGFIFYVPAWNTSKTDPATGFIDFLKPR YENLKQAKDFFEKFDSIRLNSKADYFEFAFDKNTGKADGGRTKWT VCTTNEDRYAWNRRALNNNRGSQEKYDITAEKSLFDGKVYDKSGK DLKQQIASQELADFFRTLMKYLSVTLRHNNGEKGETEQDYILSPV ADSMGKFFDSRKAGDDMPKNADANGAYHIALKGLWCLEQISKTD DLKKVKLAISNKEWLEFMQTLKG
94	Cas12	MIDNTKEKKEGVSVDGFTRKYQLSKTLRFELRPILNTPKMLDDEQVIK NDETRRKYEAVKPWFQDLHREFIEDALKSFKNLAIYQDTFQTW QKDRKSKQKKDTLVKIEVGLREEIVRRFEEVANIWVRSEQYKLLGIKK EGLGMLFEAGVFRLLKERFKNEKDTTVDGNNIFDEWTRWTGYFKKF FETRKNFYKSDDTSTAIYRVINQNLRRFCENIQIFEKISEKIEFSEVEK SFDISCAGIFSLAYYNACLLQGGIDTYNKIIGGEVDEKDKKIPGINELIN KYRQDNSGEKIPFLKQLDKQIHSKAEAFIESIETNKELVGKLTIFYENA EVKIQSFRNLIADIVTDYSGYDIDKIYLTKEAVSHNASRWFASFESFER DLFAVVAEKQNKLVYELLRTHKNDSKISDKDGKFSFPDFIKCSHIKRA LEKQEGRIWKGEYYEDIVDFEKIKDVFTQFLCVFKFELEQQFFRKTTS AQTGEQTKIGYEIFVTINELITRENVIDLEEKIAIKNFADATLLIYQIA KYFAVEKRRGWLDNYDLDDRFYKSSDIGYLNIFYRDAFEQIVRPYNLF RNYLTKKPYNTNKWVLSFENPTLADGWDKNKEKTNAAVILRKDGR YYLGIIKEDCKSLFADRYSKEMSEGIESGSFQKMAYKFFPEASKMIPK CSTQTKNVKEHFRKSSSDYNLFHEKDYKISVAITKNIYELNNVFYRKD NIEESFVPKNDFEKKLGKVKFQRQYLEISRDNNGYKQALAQWIEFCI RFLKAYKSTTIFDYSRLREAKEYESLDAFYQDINALTYNISFVPISEQYIK EKNDNGELFLFEIYNKDWSLGPMDKNRKRTKNLHTLYFEQLFSKEN EQENFLFQLNGEAELEFRPKTEEKRLGYKVWDAGEKKWVKAKEKED

		GAVIDRKRYAKDILFHCPITLNRVSESKTKREMDVEIREVLSSTPGVH IIGVDRGEKHLAYYSVIDQNGKIIETDTLNSIGKDGRGKPEYASKLEK RAQEREASRRDWEEVEAIKDLKKGYISQVIRNLADLIKHNAIIVFEDL NMRFKQIRGGIEKSAYQQLERALIDKLSFLVKKGEEDPKQTGHILRAY QLAAPVIAFKDMGKQTGLIFYTQAGYTSKTCPECGYRRNIKCLFENIE QAKTLIENLESINYNKKEDVFQISYSLEKLSSKDQKKEKKVSNELYAKT LKKDIFILTTKNALRYKWYDRYSEKAKVAKRGIDEYKGEVNESETKKG VVKEFNLTEYLKGLLKTYEIDYEHGGIREQILSVARGREFYKDFLYALFL LTETRHSISGRNTDYIQCEPEFDSRKGFKDIKEFNGDANGAYNIARK GIMILEKIQFKKDNDGNLEKMGWGDLISIEWDKFTQKE
95	Cas12	MKNFQDFTNLYELSKTLRFELKPIGGTKKLIIEKNILKLDKKKRENYEK VKPYFNKIHQEFINFALRNPNFDFSQFEKYLNWLKDKKNKDLLKEK ESIDKIFLEKIGKLFENSVDKFLKENGFEIVKEEDQNLKFFRRKEIFEVL QEKYGSELETQMVNKDGEIKSIFNGWEKWLG YFDKFFNTRDNFYKT DGTSTAIATRIIKDNLKIFLENIVAFGKIKNKKIDFSEVEKNFSVSIDTF EINNFNCFDQDGDIFYNKVIGGETLENGEKLKGLNEIINKYRQDTGE KIPYFKKLQKQILSEKDGVFIDKIEDDGGFYEV LKNFYKNAAEKEGFLK NIFENFYTISDKNLEKIYFNKIAFNTISHKFGSALEFERILYEEMKKEKA DGKFEKKENKYKFPDFIQIIFIKRSLNYSNENLFWKERYKSEENV GFLEKNNNNLWGOQCKILNFEFLNILKRRIDEAGEEYEVGFESKNIL GEKLENFELNQENKGIKDFADYSLALYSFGKYFAVEKGRNWDNLNID SDDFYGGEDGYIEKFYNTGYDEIVKPYNLMRNYISKKPWEDNKKWK INFETSSLLSGWDKNLESNGSYIFQKGNKYLLGIINGSKPAKEILEKLYS GDGEKIKRFIYDFQKPDNKNTPRMFIRSKKDSFSPAKEYNLPINDIL EIYDNGLFKTENKGNPNYKESLRKLIDYFKLGFSRHESFKHFNFVWK DSKSYENIADFYRDEKSCYKIDFEFLNFEELKKLTFEKHLYLFQIYNKD FELDESLQEKGYNFKGEGQKNIHTKYFEALFLEENISRKSGAVFKLSG GGEVFFRKKSIAKKEKRNSVEVIKNKRYTECKYFLHFPIQVNFKEEIS GNFNQEINKFLANNPDIINVIGIDRGEKHLAYFSVINQKGEILESGSFN KIENYNKNGEKLFPEREIKEIHKDGSIDLELVETGRKVDYVDYKLLLE YKERKRLQQRQSWKEVEQIKDLKKGYISALVRKIADLIKHNAIIVFEDL NFRFKQIRGGIEKSIYQQLKALIDKLNFLVNKNEINLEKAGSILKAYQ LTPVDSLKEIGKQTVIFYTEAAYTSKIDPITGWRPNLYLKNNNSKIN KENILKFDNIVFNSKENRFEFTYDLKKFFGKDSKFAKTVNTVCSCVE RFKWNRLNNNNKGGYIHYENLTDGKLANKEQKEDEFSNFKELFEKY FIDINGNILEQIKNLDTKNNEKFFSSFIDLFTLVCQIRNTNQNAKGDE NDFILSPVEPFFDSRKSQNFGLPKNGDENGAFNIARKGLIILNRSE NPEKPDLLIFNADWDNFARNI

96	Cas12	MSNNFQEFTQKYALSKTLRFELKPVGKTKEILEKEMPMYQIINADKN IKAKYIQTTPFFDQLHRDFIKEAFENVLSGLSDFENWKIYKQDKKA NEKIYKKAENLRKEVVSFLNAKGKDWAEKYHSSGLKKADIEILFEEGI FKVLEIRYGTDTNSFITNATTGEITSIFQGWKGFTGYFLKFWNTRENY YKTDGTSTAIATRIVDQNLPGYLENLEIFEKMKGKIDFESVRGDFSD EKIGTVEYYSTCLQEGIDGYNRIIGGYTYENGEEKIGINEIINLYRQTH KDEKVPFLKTLKQIGSEKIAFMETIDTPEEFRKIFEEFVLKSSEKVLL KQCLNHLFENELTDGVFLSKESLNTISHKWIDIGNMKLFHESLFTILKK EGAKYDSKEDEYKFPDFIRISDIKTALVKITTESFFWKNRYLYEKDENP TGFLTSDNSLWEGFIQIFSHEFSSLFERTEKDEEGKDIQWGYDISLLNI QKLENNENYNPNDENKIIKSFADDILRIYQMGKYFALEKKRQWNP DNLEIGEFYSHPEIGYDKFYFDSYKIIVQGYNDIRNYLTKNPWSEEKW KLNFNPTLANGWDKNKETDNSCIFLKRDNKFFLALMSRGNNQVF DERNIQKFAQNI EQGKYEMVYKMKDVALGIPKATTQLNAVQEH FFQSDKDYIITKGGSSIGEFIKPLRVTKRIFELNNRIYPKDNLGISFLRN QVNKKEQKNYIKIFQKEFITLGGDEVVYKKAVIDWIDFCKEYTSKSPS CAYFDYSGLKDTKEYSSIDEFYNDLDSFGYQISWQDISSSYIDELVESG KLYLFEIYNQDFSNGKTGAKNLHTLYFEHIFSKENQEVNFPLKNGQ AELFFRPKSIEAKGENRKFNREIIAKKRYTEDKIFFHVPLTLNRTEGDIY GFNTEINNFLAHNPDIINIIGIDRGEKHLAYYSVIDQKGNIESDSLNTV NEINYGEKLTDTAEKRKQARQDWQAVEGIKNLKKGYISAVVHKLTD LIIKYNAIVIFEDLNMRFKQIRGGIEKSVYQQLEKALIEKLNLYLVEKGEI NPEKAGHLLNAYQLTAPFETFKDMGKQTGIVFYTQAAAYTSKIDPVT GWRPHLYLYSSAEQVKKEIAKFSNIIWNNTKRFDFMYDIRNFSTQ KEYPKNNIWTVCSSVERYRWDKTLNQNKGDYVHYKSITPEFEKLFSD FQIDGTKNILEQINRMETKGNEKFFKSIFFFGLICQIRNTNKADSDE NKQDFILSPVVPFFDSRDSSENTKNGLPRNGDENGAYNIARKGLIILQ KINEFSDENGNCDKLGWKELISQVDWDNYIKT
97	Cas12	MEYDEHISLIESEEKADEMKKRLDMYMNMYHWAKAFIVDEVLD RD EMFYSDIDDIYNILENIVPLYNRVRNYVTQKPYTSKKIKLNFQSPTLAN GWSQSKEFDNNAIILIRDNKYYLAIFNAKNKPKDKKIIQGNSDKKNDN DYKKMVYNLLPGANKMLPKVFLSKKGIETFKPSDYIISGYNAHKHIKT GENFDISFCRDLIDYFKNSIEKHAEWRYEFKFSATDSYNDISEFYREV EMQGYRIDWTYISEADINKLDEEGKIYLFQIYNKDFAEINSTGKENLH TMYFKNIFSEENLKNIVIKLNGQAELFYRKASVKNPVKHKKDSVLVN KTYKNQLDNGDVVRIPDDIYNEIYKMYNGYIKESDLSGAAKEYLDK VEVRTAQKEIVKDYRYTVDKYFIHTPITINYKVTARNNVNDMAVKYI AQNDIDIHVIGIDRGERNLIYISVIDSHGNIVKQKSYNINLNNYDYKKKLV

		EKEKTREYARKNWKSGNIKELKEGYISGVVHEIAMLMVEYNAIAM EDLNYGFKRGRFKVERQVYQKFESMLINKLNYFASKGKSVDEPGGL KGYQLTYVPDNIKNLGKQCGVIFYVPAFTSKIDPSTGFISAFNFKSIS TNASRKQFFMQFDEIRYCAEKDMFSFGFDYNNFDYNTITMGKTQ WTVYTNGERLQSEFNARRTGKTKSINLTETIKLLKDNEINYADGH DVRIDMEKMDDEDKNSEFFAQLLSLYKLTVMRNSYTEAEQEKGIS YDKIISPVINDEGEFFDSNYKESDDKECKMPKDADANGAYCIALKG LYEVLKIKSEWTEGDFDRNCLKLPHAEWLDFIQNKRYE
98	Cas12	MFGNWGVIQNAVMQNIKRVPARKHKESEEDYEKRIAGIFKKADS FSISYINDCLNEADPNNAFYFVENYFATFGAVNTPTMQRENLFALVQ NAYTEITALLHSDYPTTEKNLAQDKANVAKIKALLDAIKSLQHFKPLL GKGDESDKDERFYGELASLWAEELDTMTPLYNMIRNYMTRKPYSQK KIKLNFENPQLGGWDANKEKDYATIILRRNGLYLAIMNKDSKKLL GKAMPDSDGECYEMVYKLLPGANKMLPKVFFAKSRMEDFKPSKEL VEKYNNGTHKKGNFNIQDCHNLIDYFKQSIDKHEDWSKFGKFSD TSTYEDLSGFYREVEQQGYKLSFARVSVSYINQLVEEGKMYLFQIYNK DFSEYSKGTPTNMHTLYWKALFDERNLADVVKLNGQAEMFYRKKS ENTHPTHPANHPILNKNKDNNKESLFEYDLIKDRRYTVDKFMFHV PITMNFKSSGSENINQDVKAYLCHADDMHIIGIDRGERHLLYLVIDL QGNIKEQFSLNEIVNDYNGNTYHTNYHDLLDVREDERLKARQSWQ TIENIKELKEGYLSQVIHKITQLMVKYHAIVVLEDLNMGMFMRGRQKV EKQVYQKFEKMLIEKLNLYVDKKADASVSGGLLNAYQLTSKFDQK LGKQSGFLFYIPAWNTSKIDPVTGFVNLLDTRYQNVEKAKSFFSKFD AIRYNKDEKWFENLDYDKFGKKAEGTRTKWTLCTGRMRIDTFRNK EKNSQWDNQEVDLTAEMKSLEHYYIDIHSNLKDAISAQTDKAFFT GLLHILKLTLMRNSITGTETDYLVPVVDENGIFYDSRSCGDELLEN ADANGAYNIARKGLMMIEQIKDAKDLNLFKDISNKAWLNFQAQK PYKNG
99	Cas12	MSNLYSNLHNLVQVQKTLRFELKPQGKTENMEKVILKADEHRAE IYSKVKKYCDEYHKLFDKSLNIELNGIDRYEYELYSINNRDDKQKEELD QLEASLRKQISDAFKKSAEYKGLFQKDIITSYLVMTMYKENQEKMQDI GEFNRFITYFTGYNKNRENMYSEEDKSTAIYRLINENLPTFIDNIKIY KKIVSLMPEDIEKIYKDEEYIQVDSIDEIFNISYYNDVLTQRGIECYNIL ISGRTKNDGDKIKGLNEYINEFNQTHNEKIPKLQELYKQLSDAESASF KIDVIKNDKELMNLEVYYANILPILNKIEDLFRISNYNLELILVNNDG TLSTLSNMVFNEWSYIKGAISEKYDEEYSGKEKYGTEKYAQKKQEYLK KQKIYSLKFLNDCIGNNAICEYLKNIYIQNKNIETIKEDYNEVQNIKVE

		DDTKELIKDEKSIEKIKKFLDDVKSLEQEFVKLVIPKDRTEKDAKFYSEL TPYYEKIKEIIPLYNKVRNYVTQKPYSTEKIKLNFECPTLLKGWDANKE EANLGVILLKEGKYLLGIINPYCKKIFEVDEKDSNEQNNYKKMEYKLL PGPNKMLPKVFFSNSRIEEFNPSKELQEKYNKGYHKKGKDFDINFCH ELIDFYKQSVNKHEDWKKFNFKFDTSEYNDISEFYREVEKQGYKIEY TEYSEKYINELVDRGELYLFQIYNKDFSEYSKGKENLHTLYWKAVFDP DNIMNPVYKLNNAEVFYRKKSLEMKVTHPANQPIANKNISTIEAG RSTSTFKYDLIKDKRYTMDKFQFHPITMNFKSERLFNINQIVNKYLK YNDDIHVIGIDRGERNLLYVCVIDKNEKIVYQKSLNEIVSEYNNRYT TDYHGLDRKEKEREIAREDWKNIENIKELKEGYMSQVIHILVELMKK YNAIIVIEDLNKGFKNSRIKVEKQVYQKFEKMFIDKLNLYLVFKDEDKM NEGGVLNAYQLTNKFESFTKLKGQSGILYYIPAWCTSKIDPTTGFNIR FYLKYENFDKSKEFVNRIDDIRYNEKENLFEFDIDYSKFTDRNDTKNK WTLCSYGERILTQKNANGEWLDRRIQLSIEFKKLFKEYGINLNNIKDSI LKLDKDNLEFYKGNESLGFQFLKLMVQMRNSLTGKEEDNLISPVK NQHGKFFNTSEKIEGLPIDADANGAYNIARKGFMLVEQMKNVEDE KLNKIKYNITEKEWLNYVQNRGM
100	Cas12	MARIFEDFKRLYPLSKTLRFEAKPIGATLDNIVKSGLLDEDEHRAESYV KVKKLIDHEYHKVFIDRVLDNGCLPLKNEGHNNLSLEYDSYVSKSQN EDAKKAFFENQQNLSRIIAKKTEDKAYANLFGKNLIESYKDKTDKTKI IDSDLIQFINTAESTQLNSMSQDEAKELVKEFWGFTTYFVGFFDNCK NMYTAEKSTGIAIRLINENLPKFIDNMEAFKKAIRPEIQANMEEL YSNFSEYLNVESIQEMFLDYNNMLLTQKQIDVYNAIIGGKTDDDEHD VKIKGINEYINLYNQHKDDKLPKLKALFKQILSDRNAISWLPEEFNS DQEVLNAIKDCYERLSENVLGDKVLKSLGSLADYSLDGIFIRNDLQLT DISQKMFGNWGVIQNAIMQNIKRVPARKHKESEEDYEKRIAGIFK KADSFISYINDCLNEADPNNAFYFVENYFATFGAVNTPTMQRENLF ALVQNAYTEVASLLHSYPAEKKLAQDKANVAKIKALLDAIKSLQHVF KPLLGKGDSDKDERFYGELASLWAEIDTVTPLYNMIRNYITRKPYS QKKIKLNFENPQLLGGWDANKEKDYATIILRRNGLYLAIMDKDSRK LLGKAMPDGECEKVMVYKLLPGANKMLPKVFFAKSRMDDFKPSK ELIEKYNNGTHKKGKNFDIQDCHNLIDYFKQSIDKHEDWSKFGFNFS DTSTYEDLSGFYREVEQQGYKLSFARVSVSYINQLVEEGKMYLFQIY NKDFSEYSKGTNPMHTLYWKALFDERNLADVYKLNGQAEMFYRK KSIENTHPTHPANHPILNKNKDNKKKESLFEYDLIKDRRYTVDKFMF HVPITMNFKSVGSEINQGVKEYLHHADDMMHIGIDRGERHLLYLVV IDLQGNIEQYSLNEIVNEYNGNTYHTNYHDLLDAREDERLKARQS WQTENIKELKEGYLSQVIHKITQLMVKYHAIVVLEDLNMGMFMRGR QKVEKQVYQKFEKMLIDKLNLYVDKKADASVSGLLNAYQLTSKFD SFQKLKGQSGFLFYIPAWNTSKIDPVTGTVNLLDARYQNVEKAKAFF

		SKFDAIRYKRIRTGSLISTMTSLVKKQKVQGLSGFYAPEECVLILSEIK KKTTHNGIIRKLT
101	Cas12	MISLNYFQNQYAVAKTLCLELRPIEKTMEYIISGILKEDEHRNESYKL VKKIIDDYHKAYIELSLRFELKITSCSKNDALEDFYCQYLANSSQEEKDK NIFKKTQDNLRKQIAKHLTQGEAYKRIDKKELIQEDLLEFVAADPDAA NKKILINEFRDFTTYFTGFYENRKNMYSEEAQSTAIAYRIIHENLPKFID NMGTFKQLMQSSITDILPQIFDNFKKDLEVSSIQEIFDLNRYFNKVLTK KQIDIYNAIIGGKSLNENSRIQGLNEYINLYNQKHENKLPKLLKLFKQ ILSDRNSLSWLPEAFETDKQVLHAVRKCYANLKESVLHEAGLVQLLSS LPSYDSTRIYIRNDQALTTISQKLFGDWGIIPHAIKERLKKDISAKRKET EEAYLERIEKAFKQADSITYIAYINDSLKEIGVDKKNIEDYFIHLGAICTE GQEQENILQRIASAYSQAQPLLEKVPVHKNLMDQKDSVELIKSLLD ELKNLQHFIKPLLKGKSESDEKDERFYGEFVGLWNELDQITTLYNKVR NYVTRKPYSEIEKFKNFQATLLKGWDRNKERDNTSILRKNGLYLA MRKEYNKVFEKYPAGTEENCYEKMEYKLLPGANKMLPKVFFSKSRI NEFNPSQQLQNYQMGTTHKKGDKFKKEDCHALIDFFKTSIEKHED WKNFNFQFSPTSVEYEDMSGFYREVEQGGYKLVFRSIDAEYIDKLVEE GKIFLFQIYNKDFSPFSKGTPLNHTLYWKMLFDERNLNNVVYKLNGE AEIFFRKKSTITYHTHPAEIPIKNKNVQNKKKESVFQYDLIKNHRFTI DSFQFHVPIPMNFKNAGLSNLNEQVYTYLRENKDAHIIGIDRGERHL LYLVVIDRYGRIVKQFSLNEIVNEYHGNTYTTNYHDLLDKREEARQQ ARQSWQSIENIKELKEGYLSQVVHKIANLMVEYHAIVVLEDNLIGFM RGRQKVEKQVYQKFEKMLIDKLNLYVDKKKAPEADGGLLKAFQLTN QFESFQKLKGQSGFLFYVPAWNTSKIDPCTGFTNLLDTRYENIAKAQ KFFRTFDAIRYNAVKYDFELEDYDKFKRAEGTQTKWTLCTYGTRIK TFRNPENNNQWDNVEINLTEEFKKLFKQFGINLSGDLQQAICAQTE KSFFESLLRLLKLTLMRNSITGTDVDYLLSPVQNAEGYFYDSRKGDK SLPANADANGAYNIARKGLWVVIQKQTPQGQKAKLSISNKEWLKF AQEKPYLKD
102	Cas12	MKTFENFTNLYSLPRTLRFELKPLYKTKEIDSKQELFPKDKRIDEIYQN IIPCLNELHSDFIEKSMENKDFQNIIPDNILKIYSNEKNIDDFKNIKDL IKQINWFLKSNKTFFAENYSDLLGKNSIDIIPKVFWEKIYKKDDSWKIF LYNDLLWKSYEELINIYFKWFSTYLSNFKNRENLYDKKNEAKVWSV SGRTIWENFPRFLQNCINFRDKLEKLNLSIEQKDIFITNNFWKCSQK QIDYYNKIIWQINSKTNEFNQKNGLKWNKKLPKLLLLHKQILWKSEN ENILNFINNIQTDFELEQEIKIINKDIFQRIDFIKKSIVSNIEDFELEKIFIK KNRLKDISLLMDNYSVLEKLLPEFNEEWKIENELVNLSKIKKSFENI

		DLKDLKNIFKKEYFDESKDWFKLFLNWIYNHFSLENNIKHTHKL VQ DKLISWNFSENIQKSEKNINLRDEIFVSSKWLKAYLDSILALDRFVH MFDYWEQKDFDSNFYNNIEEYSINFSPFKTYNAVRNYLTCKNYSTD KIKLNFDPDFLGSNSLWKYAFIYKDSKWFFYLLWVLDHSNSQSKYKP QILKNNTefyQLEYKQIKFNTLAWKWYIRDFWVKYSEDENCIINLKT IKKQYLERYPVLKEIVDFQTDDKKIFDAKVKLTILEQAYSINFVNI DKNYI LEENNNWNLHFFQIYNKDFSENKKINSMENLHTMYFKALFEKENFN WWACFKLNSQWAEIFFREKSINEKKVKDLKTRNENAIEKKRYTENK VFLHLPITLNFINKWYSKYFWYINDSVKKYIKENKISIIWIDRWEKNLI YFSMINENLEIIEKLSLNSLILKVSDLEEKEVNYFEKLSKKEWNRNKER KDWDEIETIKELKEWYISQIVDNLVKLIVKHNAIVVMEDLNSGFKRW RQKIEKQIQKFELALAKKLNTVDKNKKHDELW/WIYKAYQLTPQIE NFQDIYSQTWIIFYTQAAYTSVTCPNCSFRKNYQKYENESKFKEFFK KYILEIKFEDNCFIIKYKIDEKIDKKKNLKKLEFQVNTKNQIRLKFESL KWKWWETKEFNITEKFEIFEKHKLDLWNLKEELLAWNWEIQLYKD FMFYFNLLQLRNSKENDNWWYISCPSCWFHSGNWFQWFSYNW DANWAYNIARKWRIILDKIKKDEKNLWITNVEWDNYYQK
103	Cas12	MAVRSVKLLVPRDGSASVRKRKALWATHQFVNDAAYAAELL EMRQEDVCRGTDDHGKDVIEPAAHWQAKLRARLAQQLPPVAVA EALPLLKAFYGSRLIKSFVANDKGVAGTGNATDLNTWLSGLVDPASV AGEKTELKQLLAELPLCEAADADFEAARKMLAKSDAREALLEGP GTGVGWPAAYNANPTDSVWLDMLHKAARLEADTTVSELKK LGVFPLQAASSNRVFGSGVLNPFERMAAAQAAAALLPWETKRHE MRKRRDKFADQLNQWDETEFGASHATALAAIRAFEAESERARRESL GNEGTYRIGGRELDAWTLLRDWLKGHSTATAAAREDKVRELQA KQGRSFGSHRLSLWAKPAQQWLADHSAGDVVTRIAVRNARQRK LDTARTLPIWTGADAVKHPRFANFDPPNNTNQPGFDLRAGTQKGR LTLRLSLLTERADGLLAQDHDQFLVPSRQMAEIVLHKDGKERALS QSQDGIGRQVGDVGGSSALLFSRDHAECLLERKQITRLERGAWPAAL PVWFKLSLDIGAHEKALLKQRFKWGVWLNLSALVTRNAKDAKGVPP PVGTRVLAVDLGLRSAATVSVWQVDAATPVVAGKWRVPLSDTLS AVHERSAMLALPGEHVDAGVLAARRAANEKLAGLLAATSHLSTVFK LGRAEQGDRRRELLERLGEGDDRRARAATAAERDGLRAVLGA TQDAWAGAVAAVWRRLETLAGAIAAYRKQQRQREDVQLRREARHG PGASQLPKQAAERLLGGKSAWQIEYKERVRLKLLTRWIMRQRPD TAVRRLARKDLGKYCGLLDHLTALKEDRAKTADLIVQAARGVR AHKDAHGRQQDRELWLAKYAPCDLIVMEDLGRYRFATDRPPSEN QLMQWTHREVRLVQMQAEVEGIQVLETGAEFSSKFDARTWAPG VRCEPITKLWVERYRNGEMPWLADKADEWRREGIELAQLVPGQLL PTGSGEQFVAVSATGGLRVRHADLNAAQIALRALTGHTAFRLTA

		RRLGDFVFSAGLGGKRPQGALWREFGSALPPAVVVLRPAGEVRYAL RPFASARDAAAAALGLQLGALRNVDATDAESDAEDGDLAELLAGAD PDRATFFRDPSPGDVHGGAWVQAKVFWAEVRRHVRLGLQAQGLLP AAARSSEPRQMLPLAGALPGDDIPL
104	Cas12	MLDKFASLYPVTKTLRFRLLPQGRTEENMQVAKVLENDLERSEAAA VVKGLIKKYHLQFISDTLSGSTLSWQALTETLDKFKADHTATAELDSA LAAYRCKLAELFTKSPKYKVMATPVSIIKEILKTETDPENIAALNKLNG YTYIIFDYVSTRMLTYSADAKATSLAYRLVDENYLRFYQDISAAAEISA VLEEAGFDNAEVEAFIRTDYNTCLTSEGIASFNAAGSINQFVNVL QQNPVLQSEPALRRHLQPLYKMMLDEAESKIKFEDYGQLRDAVENF RRNFQDL PQSLIDIFAGRYDYSKIYVGKYLNASSQIAGGYNWKLE NALED FYSKPYLVNGKLPVKYKTVVNKKMNQLAYSFTELQEALDAG DSGSSITDLFGKYAELHAAYAAADGNVFYKEYDRKSIASLKNYLDV NAIARFIKFAAPEVYVKDEGFYGIVDGAADKL RDFDLYNMVRNYIT KKPYKSKVALTFNSSSFGRGWDENKIYDELTTIFTYNGKYLVGINK NDKPDAAAVSKDEGGYKRMVYKTFDIVKQLPRLSFTKAVKAHFAE SDEDFIDGPKFAKPLRVPKEIYLQSFTDNGDKLADS AKKYTKAYLD MSGDYKGYEAIKRIDYTKELFLSAYKSTSIYDLAFLKPAGKAAGSLCW TRHI
105	Cas12	MKTFENFTNLYSLPRTLRFELKPLYKTKELIDSKQELFPKDKRIDEIYQN IIPCLNELHSDFIEKSMENKDFQNI PNILKIYSNEKNIDDFKNEKDL IKQINWFLKSNKTFFAENYSDDLKGNSIDI IIVFWEKIYKKDDSWKIF LYNDLLWKS YEELINIYFKWFSTYLSNFNKNRENLYDKKNEAKVWSV SGRTIWENFPRFLQNCINFRDKLEKLNLSIEQKDIFITNNFWKCISQK QIDYYNKI IWQINSKTNEFNQKNGLKWNKKLPKLLLLHKQILWSEN ENILNFINNIIQTDFELEQEIKIINKDIFQRIDFIKKSIVSNIEDFELEKIFIK KNRLKDISSLLMDNYSVLEKLLPEFN EEWKIIKENELVNLSKIKKSFENI DLKDLKNIFKKEYFDESKDWFKLFLNWIYNHFSLENNIKHHTKL VQ DKLISWNFS ENIQKSEKNINLRDEIFVSSKWLLKAYLDSILALDRFVH MFDYWEQKDFDSNFYNNIEEYSINFSPFKTYNAVRNYLT KKNYSTD KIKLNFDPDFLGSNSLWKYAFIYKDSKW FYLWVLDHSNSQSKYKP QILKNNT E FYQLEYKQIKFNTLAWKWYIRDFWVKYSE DENCII NLKTL IKKQYLERYPVLKEIVDFQTDDKIFDAKVKTILEQAYSINFVNIDKNYI LEENNNWNLHFFQIYNKDFSENKKINSMENLHTMYFKALFEKENFN WWACFKLNSQWAEIFFREKSINEKKVKDLKTRNENAIEKKRYTENK VFLHLPITLNFINKWYSKYSFYINDSVKKYIKENKISIIWIDRWEKNLI YFSMINENLEIIELSLNSLILKVSDLEEKEVNYFEKLSKKEWNRN KER

		KDWDEIETIKELKEWYISQIVDNLVKLIVKHNAIVVMEDLNSGFKRW RQKIEKQIQKFELALAKKLNFTVDKNKKHDELWWIYKAYQLTPQIE NFQDIYSQTWIIFYTQAAYTSVTCPNCSFRKNIIYQKYENESKFKEFFK KYILEIKFEDNCFIIKYKIDEKIDKKKNLKKLEFQVNTKNQIRLKFESL KWKWWETKEFNITEKFKEIFEKHKLDLWNLKEELLAWNWEIQLYKD FMFYFNLLLQLRNSKENDNWWYISCPSCWFHSGNWFQWFSYNW DANWAYNIARKWRIILDKIKKDEKNLWITNVEWDNYYQK
106	Cas12	MSFLVPHLPTVVSRLGGYSSAMDQTPTRLTPAVKNTAAATPKPEV PLTQRAYTLRLRGANDGDQSWREAVWATHEAVNMGAKVFGDWL LTLRGGLDRELADAKVKAGNNNPDRNPTPEERRGRRVLLALSWSLV ESAPKKGDAYEKFVIASGKKDSQSIRDEKVVRLREILAKRGVANQD LEGWIVDCEPSLSAAIRDDAVVWNRSAAFDAAQCRVGTSLTREEIW DLLKPPFGSCESYLAASLTDESDTEAAATDDKAKDLVQKAGQWLSS RFGTGKGADFAAMSKVYSETAFWAGRASPFRSGAEALRIAESLKSF CPKSFADAGILGLISPGYKSATRNIIKAWSKRAGPVTADDLANLSA VAAEDANKCSANTGSKGHRPWSDAILCEVENACGFTYLQPDGPAL HSEFAVMLDHAARRVSIHSHWIKRAEAERDRFTKDALRIKEVPDPIR VCLDRFCADRAGTSGAIDGYRIRKRAVSAWKEVITRWGQAACKTAE DRVIAVRETQADPDIDKFGDIQLFEALAVDDAEVWRVNGEVTPQP LIDYAAATDAEAKQKRKVPAYRHPDPLSHPVFCDFGNSRWKIRFA AHDAVTKLANARTSLDRREADLAKAKERLDKATAPEEQTEGKESLEE AERHLRDARDRVAWLSSMHAFSMRLWGAGRVGDGQRLFWSCKR LTDDMALRQNSGQAPTIAVTRADRLGRAAGADTADSVLDILGVFT EEHWNGRLQAPRAQLDVIAAHVAKNQWDAKAKKMRDRIRWLVS FSAKLQPVGPWIEYSATFPEAALAKPFVSRKGEYAVRHVSNDDRAG LGKLVLSRLPGLRVLSVDLGHRYAAACAVWETVSIAQTNAACDAAG HELPTESDLFLQLSTTDLTGKNRTTIYRRIGADMITDPKTGEKTPHPA PWARLERQFLVKLPGEDIPARKASPAEFDAIRLEEAFGRTRTADDP LLVRVDELLAATVDSARLALRRHGDAARIAYAFKPSAEKLTGGGRE VMSPEARKAMILDALLLWHGLWHGDRWADVWASQQWDAYIKP ELGMDLPPWSETSGEPRCQYRSKVEGLLKRVAESLAARDGAGLHLL WAEQWRTRNAKWLGNTHLRLRLSLLPRGLTTSTPAAWNNGGL SLTRIATLSLYQLHKAYHMRPEPEDPRKNVPAKGEEELRDFGRGML DVMERLREQRVKQLASRLAEALGIGRMKASEGKRDRKRPRAQID QPCHAVVIENLKNYRPEETRTRRENRLMSWSSSKVKYLSEACQL NGLHLREVQASYTSRQDSRTGAPGIRCADVVPQDFFTKPWWRQ VSIAGRVNQGRGDARERFLADLDAKWSAAEKSERITAPPLRIPVN GGELFVSADLHSPAALGLQADLNAAAANIGLKALLDPDWPGKWWF VPASLDADGWRVPAKSCAGAEWVKNWKVGQLGDSYAPNGKPL QPTDDEGVKKAEDGVKLAKASLDDAEQALKAAKTKRKAIDVASA

		RAQEAKKNVDDMKKALVAAKKGASAKEIINLWRDPVGVDPADFAS GEPWRAYTVYKQRYVEYHVINDVLRGRAGPRSDRP
107	Cas12	MSITRSIKVKLIVPRDASLEARQLREGLWATHLFVNDGCHYERLLE FRQRDVCVGKDDAGKDVIVPAAEWADRLRARLGRNGMVPSHIEA ALPIFRELYENMVPSALKAKSGTGQAGRSWHSKLVSPTRSGGEASA ARIDVLRPLLPVSGDDPAFEPAAARALIEEAGDELLTSTGRCPAWVTA YRKGPEGSAAWVEKLRIQLREAVEAGDFDPPSDPQILAAGAVPAAPP LGAGIDALRPLLPVSGDDPAFEPAAARALVEDIGDELFTSTGRPTWV TAHPTWVRAHRKDAECLEAADDFKWVERLRQLRDDAKAGKFEQ PLHERLGALGALPVAKPIGAGRVVSRADLTVFERGAMELAIEHLIGW ESAGHRARAQYVERKKRHDDLLQWIEAEAPDALLAVRAYEAARTIH LATLGELGAAPQYTLRLREIRPWRLREWLLQNPDATIDERRRLAT MQTNDPRGYGGEALAWLAAPERRALVEHPAGDVVTRIAVLNIRKSI LDRSRLFPTCTLADPVEHPRFAKFGKPGDKNSAGYALAVDGVRRERAI IKILVPRQDGLLVPTDLRVFPAPSGQMRDLRASGLDISYERQDGRGR QAAKLQGGNLMFDRTHFARCGAPGPEALGSVWIKVALDLSSPAAS LAMKTATPVRTYLSTAVRGRPESTKYEKAAPPEGFRVLSVHMGLRT AATASMLRFGAPEEGGHEVPVSGLAGETLVAFHERTVTMKLPGED PDTRTEANRGVAKRELRLGRGIGCLKAIRRASASATPEDRAEALVII ETHVGQGDRLHGWAPAEAVGRLDPHGDPDDWKTACAALYA AVEA DLGVAISSWRKAARAGGATGMLGGKSLWAVDHLERSFRFLRSWDL RARPHDGDPRRPRPGYASKLLHHIDGVKDDRVTADTRIVQAACG RAWIGGPTVKRGTQDVRLPGRWEQGRPRADLILLPDLTHFRFRSDR PRAENSRLMRWAHRQLAIYVRMQAEVEGILVADTGAAFTTRFDA WTGAPGVRCEPVTADHLRGIKREDYWLARLLREGALKHLRIDPAS LRVDDLVPMDHGKILVALDGVLDPLRLDLDVNASQGLGRRYIEG HGLAYRLPGARVPRGEGEREAAVVHIKGRLASAMGGTVVVLRASE GPGDITWTAEVYDRPQGARKALGLSLAAFNSIATAAVDDEGPAPEN DDEALEEEEEEALGIATGERIVFFRDPSGAVAGGGWLEASAFWGIA NRMVTDRLRELGRLG
108	Cas12	MATAVDTSTTRAYTLRLSGGNNWRELLWQTHVAVNARGAWVWG DWLLTLRGGLPASLADGDAERRVVLALSWLSVESPASLAPQAHIVA YGS DARDERNRKVTERFRDILRRMGIKQQQEWEWLDACLALMAS IREDAVWVDRSACFAEAQQCYRGLSSEWARKTLDFLGGEDDYFKP SAKEGASSKAKDFVQKAGRWLSRHWGAGKKSDPRDISTRLGKLAG VDPKAIDGHTGRAALEDLLRTLGSRPAQNADAELKLYRQLKRAVGW KGRPSKGAVALKKIRDAERVPNDLWKEIASTLREEAAVQSSQTS DH

		AAVPDWRSHWPAEITGLPMPYRVDYIWEHGVMMLDHALRRVSS AHTWIKRAEAERRRFQQDAAKMGSIPEEARNWLDAFRERRSSSSG ATGDYLIRERAINGWDKVVQAWETLGPNSTRDQRIAAARDVQANL DEDEKFGDIQLFAGFGDEHVDDPERCLADDRATCVWRNSSGRADG RILKDYVAATVAEHNQRRFKVPAYRHPDPLRHPVFVDYGKSRWSIN YSALTAQQRRKTTQKLAQAKTDNTRAKLQQQLASTADLRSVTLGV WDGNRIVKISQRWRSKRFWRDLDLHFGSHPSAAVSRADRLGRVA ARQDPGAAVYVAKVFEQQDWNGRLQVPRRELNRADVVYVGKA DPDFGKLERLDPRARRLWERLSWFLTTSATVQPQGPWLDYVAAGL PSGIQYTKSRAGYYLNYDANHGRKGRARLCLARLPGLRVLSLDLGH YAAACAVWQTLTIEQMTNECRQAAHPAPSNDLFIHLRHPHHPKQ KSGRKKGRPVTKTTIYRRIGPDKLPDGTDPAPWARLERQFLIKLQG EDRPARYASQKEIDEVNQFRNFVGLPIVDRPRVDDLHSDAVRVAR LGLRRLADAARIAFAMTAACKPISGGHEVELTTAQRIEFLQDALLW QSLAASRRYRDDWAELWQSWVVEKLGGPQPAEIADDLPRSQRA ASLKTARQSLRKVAEKLSDGQSPSAAELHRLWAERWQQRQTEWR RHLRWLRRLLPRRKDHQQEDRPLQRVGGLSVKRIQTIRQLYQVLKA FRMRPEPSDLRKNIPAPGDRSLASFGRRLNHLERLREQRIQLASRV VEAALGAGRISKPPGRDRRRPQQPVDPRCHAVVIENLQHYKPEDSR LRRENRLMDWQARNLRKYIVEGCELHGLLFVEVSPAYTSRQDSRT GAPGLRCEDVSRTALQEAARRMHASHSRPSNSSPGGSQTQFEREV CRWINEFKRVEGSSSSLSARQAVLKAFLHHQASIPSTSLTILLPRRGG LFVSADPDSPLACGLQADLNAAAANIGLKALTDPDWMGAWWVFLV DRASGQPVEEQVQGCPIWLSCGPLSNSNPATIDPSDSPTAARRSNG TGAKGRARANNEYWSSLSATTLPDHKAWQPTQDYWRDIEQRVV KRLRLLDGSEWSED
109	Cas12	MLDKFASLYPVTKTLRFRLPQGRTEENMQVAKVLENDLERSEAAA VVKGLIKKYHLQFISDTLSGSTLSWQALTETLDKFKADHTATAELDSA LAAYRCKLAELFTKSPKYKVMATPVSIIEILKTETDPENIAALNKLNG YTYIIFDYVSTRMLTYSADAKATSLAYRLVDENYLRFYQDISAAAEISA VLEEAGFDNAEVEAFIRTDYNTCLTSEGIASFNAAGSINQFVNVLL QQNPVLQSEPALRRHLQPLYKMLLDEAESKIIKFEDYGQLRDAVENF RRNFQDLQSLIDIFAGRYDYSKIYVGYKYLNEASSQIAGGYNWKLE NALEDFYSKPYLVNGKLPVKYKTVVNKKMNQLAYSFTELQEALDAG DSGSSITDLFGKYAELHAAYAAADGNVIFYKEYDRKSIASLKNYLDV NAIARFIKIFAPEVYVKDEGFYGIVDGAADKLRFDLNLMVRNYIT KKPYKSKVALTFNSSSFGRGWDENKIYDELTTIFTYNGKYLVGVINK NDKPDAAAQVSKDEGGYKRMVYKTFDIVKQLPRLSFTKAVKAHFAE SDEDFIFDGPKFAKPLRVPKEIYLQSFTDNGDKLADSACKYTAYLD

		MSGDYKGYEAIKRIDYTKFLSAYKSTSIYDLAFLKPAGKAAGSLCW TRHI
110	Cas12	MCIRDRDLAVAALNRGDAXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXGQLNAIRNFLASDGYGAHDLVPVNYNGSNDRGAEVQVGN QKNWTVTSSAPVVVQYNNADTTLVQGHTDRLIVTGSNDTITLK DSGDDKVLGDNNTVAGSGADTIVGGAGNDVLIGTNGGYGTEL LGGAGNDVLRNAGSHGIYMDGGAGNDTFYGGTGPDTMEGGDG NDLMYANGRGSSIDGGAGNDTIYGGPGGDTLTGGDGNLLRSDS AFGKKGSGNLLVGGAGNDTLWAGAGYDTLKAGSGSDTLISGTGSS QMIGGSSGNTTFEYAYHTGNDTITGSGSGNTVYLDGRDFSDATISN HSGVTTVSFSDGQVLKISGVQDIVFSDHDYKV
111	Cas12	MSITRSIKVLIVPRDASLEARQLREGLWATHLFVNDGCHYERLLE FRQRDVCVGKDDAGKDVIVPAAEWADRLRARLRNGMVP SHIEA ALPIFRELYENMVPSALKAKSGTGQAGRSWHSKLVSPTRSGGEASA ARIDVLRPLLPVSGDDPAFEPAAARALIEEAGDELLTSTGRCPAWVTA YRKGPEGSAWVEKLRIQLREAVEAGDFDPPSDPQILAAGAVPAAPP LGAGIDALRPLLPVSGDDPAFEPAAARALVEDIGDELFTSTGRPPTWV TAHPTWVRAHRKDAECLEAADDFKWVERLRQLRDDAKAGKFEQ PLHERLGALGALPVAKPIGAGRVVSRADLTVFERGAMELAIEHLIGW ESAGHRARAQYVERKKRHDDLLQWIEAEAPDALLAVRAYEAARTIH LATLGELGAAPQYTLRLREIRPWRLREWLLQNP DATIDERRRLAT MQTNDPRGYGGEALAWLAAPERRALVEHPAGDVVTRIAVLNIRKSI LDRSRLFPTCTLADPVEHPRFAKFGKPGDKNSAGYALAVDGVRRERAI IKILVPRQDGLLVPDRLRVPFAPSGQMRDLRASGLDISYERQDGRGR QAAKLQGGNLMFDRTHFARCGAPGPEALGSVWIKVALDLSSPAAS LAMKTATPVRTYLSTAVRGRPESTKYEKAAPPEGFRVLSVHMGLRT AATASMLRFGAPEEGGHEVPVSGLAGETLVAFHERVTM KLPGED PDTRTEANRGVAKRELRLGRGIGCLKAIRRASASATPEDRAEALVII ETHVGQGD RHGWAPAEAVGRLDPHGDPDDWKTACAALYAAVEA DLGVAISSWRKAARAGGATGMLGGKSLWAVDHLERSFRFLRSWDL RARPHDGDPRRPRPGYASKLLHHIDGVKDDRVTADRIVQAACG

		RAWIGGPTVKRGTDQVRLPGRWEQGRPRADLILLPDLTHFRFRSDR PRAENSRLMRWAHRQLAIYVRMQAEVEGILVADTGAAFTTRFDA WTGAPGVRCEPVTADHLRGIKREDYWLARLLREGALKHLRIDPAS LRVDDLVPMDHGKILVALDGVLDPLGLRILDVDNASQGLGRRIEG HGLAYRLPGARVPRGEGEREAAVVIHKGKRLASAMGGTVVVLRASE GPGDITWTAEVYDRPQGARKALGLSLAAFNISIATAAVDDEGPAPEN DDEALEEEAEALGIATGERIVFFRDPSGAVAGGGWLEASAFWGIA NRMVTDRLRELGRLG
112	Cas12	MAQASSTPAVSPRPRPRYREERTLVRKLLPRPGQSKQEFRENVKKLR KAFLQFNADVSGVCQWAIQFRPRYGKPAEPTETFWKFFLEPETS PNDSPSEFRRQLQAFEEAAGINGAAALDDPAFTNELRDSILAVASRP KTKEAQRFLSRLKDYQPAHRMILAKVAAEWIESRYRRAHQNWERN YEEWKKEKQEWQNHPELTPEIREAFNQIFQQLEVKEKRVRICPAA RLQNKDNCQYAGKNKHSVLCNQFNEFKKNHLQGAIKFFYKDAEK YLRCGLQSLKPNVQGPREDWNKYLRMYMNLKEETLRGKNGGRPLH CKNLGQCEFNPHALTCKQYQQQLSSRPDLVQHDELYRKWRREYW REPRKPVFRYPSVKRHSIAKIFGENYFQADFKNSVVGLRLDSMPAGQ YLEFAFAPWPRNYRPQPGETEISSVHLHFVGTRPRIGFRFRVPHKRS RFDCTQEELDELRSRTFPRKAQDQKFLEAARKRLLETFPGNAEQELR LLAVDLGTDSARAAFFIGKTFQQAFLKIVKIEKLYEQWPNQKQAGD RRDASSKQPRPGLSRDHVGRHLQKMRAQASEIAQKRQELTGTPAP ETTTDQAACKATLQPFDLRGLTVHTARMIRDWARLNARQIIQLAEE NQVDLIVLESIRGFRPPGYENLDQEKRRVAFFAHGRIRRKVTEKAV ERGMRVVTVPYLASSKVCAECCRKKQKDNKQWEKNKKRGLFKCEGC GSQAQVDENAAARVLGRVFWGEIELPTAIP
113	Cas12	MNIIMENFEKFNLYELSKTLRFELIPFSQTKVELEKDWIIEKDREIEEK YHIIKEKLDLHIKFVWQALEWVDLSLLEEYAEYFACKKDTKNKKLKS KFEKLEKKIRQEITSFFDAEWNKWKEYGFLKKWWTSFLEKEILDVL IDIFPENKDDFEIFKWFFTYFSNFESRKNFYKDEWKAGQIATRAIDE NLTTFLENIKYKNFKKENPDFTENEKVFELDFYNFCLTQKWIDNY NEIIWAKSLEEWKNTQGVNQRIINLLKQKNEKSNKKNLSYPKFDILYK QILSEKSENDIPNIENTEELFTVIQKSIKENDKKITEIDKLKFFLEEN NIDIWKVYISKQAVNTISSKYFENWSSLWWYLVWENSKKKYFSLWEI KEALEDIKEKNIFKGEYNNKIAFENKSNFENFLAIFYEFQTNLSLLN WNQNNLESQKEFKKEEKQVDIIKKYFDSVMDLYAMSKYFFVDLK QAKNFPKDIEFYNDFDLYFSYEPWKVYNLVRNFLTKEVKTDKFKL NFSNSQFLTGWDKDEKERFWVILRKNEKYFLAILKNNNKIFENYR

		ENNPTDFYEKMEYKQLNNVYRQIPRLGFPLQKKLDSLKWKEEYLE KYKNNFWYNKEIAFIKEEFDIFQKNKEKWEKFDREKLKKLIDYYKKVV LEKYSDLYDLKKLENTDYDELVNFYDDVEKSMYSLHFTKIETEFLENLE KNWEIYLFQIYNKDFSDYKKENTKENIHTKYFKHLFSEENLENLKIKLS GWAEIFFRDKTHNLKQKLDKNWKKMFYWENKDKKVLHRRYAKD SYGFHISITLWANNWDMYKFNQFFNKNFTPKHIIIGDRWEKHLAYY SVIDLEGNLVETDTLNIVNGINYLEKLENIKSRMQERKSWWEIENIK NLKDGYISAVVSKLTEIEKYQAIIVFEDLNLGFKRWREKIERQVYQKL ELALAKKLNLYTFKNKKDCEIWGVNLNGIQLVPRVKDYQDIANYKQSG IIFYTNPAYSTTTCPEGWRKTLKFPSKITKTSILEFFKEIQMSFYWEKF SFTYENILWKSETLFSNVKRTQWNNKSRKIEHKENITQELKSVFEKYN INLWENISEKLQQTDMILLEDKLVLFYNFKLINNIRNSDSKLEEDIISCP CCLFNSENWFKGAYFNGDANGAYNTARKGIIMLENIKVNPERSNLF VRNEEWDEFLREEF
114	Cas12	MSKLFENMTNLYSLNKTRLFELKPVGNTRELIESKDFFKNDEEKAEN YQFMKEKMDKIHRNYIQKSLETIKMLPILDQTEQRLKKEDIKNELKS LRSFISAAFVSVDLLSNKIIEWLISEASIEEKEKIKKFDKFFGYFKTYVQ NRGNLYKAEDKAGQIAFRLIDENLPRFFKAKQIEEIIKKTPDFVVKER NEKQEETEEKITEYLSIFYLNSYCHYLSQSGIDLFNEIVGHINLSINLYK QKTGVKFSLIPLLYKLPLAPRKQISRLPKQIENPEEELIVKSVLDRIDQ KINPFINNILQTVLEENSVYDLNWIYISIKTTEQWWISIGLSGRNSLREL GYNQSKNWEELVKAENKFPFISLGEIKSFLDAKQLAWDDIKSVF WEGKSQSLMNWSWSNIFFHLIGKEISSLIEKYLHSRKNYQISQSKEN QKHVLDNSLSLWRLGWFVLMHKKTHLTPEIKESFFYDWENGLDAI VFDENS DPIHTIYDKVRNCLTKKPYSNKDKIKVNFDCPYLLWGWWDQ NYDAFGWLIFHDWKYFLWLIKGSWLNMEEKKNKLYEWINPMNSIT KIIYDYQKPDFKNVPRLFIRSKWDTFAPMVREYWLPVNDILYLYDNE LYKPKKKNPWKHKSYLRLRIDYFKLWLSKHKSFKHYIFKRKESDQYEN LAEFYSDFEFSCYAIKKEKVNFDQVKALCESERLYLFEIYNKDYNQFSK WKNKNLHTQYFEALFEERDNNLFMLSGGWSIFWRESNWKIVEKIR SYSPKYNIEIIDKRRYTKNKLMIHIPIVLNFCRNQEWVRVNDMIKSLIQS QSNFTILGIDRWEKHLLYSLIRQDWTIKTGSRNTITNKIKIVDYHK KLDDREKKRDEAQANWEQQEQIKDLKKWYISQVINEISKMIIEHNAI IVLEDLNGWFKRWRQKVEKSIYQQFELALAKKLNHLVFNKRWDTES WGTMKAYQLTPLVAQFQDLSFQTWVVFYTPAWYTSTTCCGWR KNIYFKYENKQAKIELEKLNIVRENNYFSITYTAEWVNKKWKITWS VLNKTDRIITTKWQTRLQYDRASKNTKEYDITDFNSVFTAKFLDYKI RLENAGSKQCRNLINSINLLLKIRNAKSGTDITIQCPACEFHSQWW

		FQWNEFNWDANWAYNIARKGKVIIDKIVKGEKNTTVSQIEFDNEIQ K
115	Cas12	PAYRHPDPLLHPVFCDFGCSRWQICFDVRKNVRTTSPRRLCLTLFTG SGMELVPFSWQSKRLARDLALEQRHRNPEASEVTRADRLGRAAAG VSAGGAVSIKNIFNEENWNGRLQAPRSQLAIAARVDKHGWDAK ALRMLDRLRWLITFSRLEPTGPWIEYALRIPDDAAAKPFLSRKNGF AVLHRSNDDRKGLAKLILSRPLGLRVLSVDLGHRYAAACAVWETLSA DQVREACQAAGHDGPTCDLYLHLKKDGRVTIYRRIGADTLSDGTP HPAPWARLDROFLIKLQGEHKAREASNAEIWAVHQMEEALGRSV PLIDRLVASGWGQRTEGQRARLEALKQLGWRPVAEKLDSDDEPGV MEESPAIKPSLSIDELMSSAVRTMRLALKRHGDRARIAHYLITDEKTK PGNVKEQLDENGRIELLQDALVLWHDLFSSKGWQDNKAKELWYV HIATLPEYKAFQSSGEGHAGPERRGKPEEDREKLGVAQALAPNVT LREALHNAWKRWEEEDARWKALLRWCKDWILPRGEAANS PAIR KVGGLSLIRLATLTFRRKVQVGFFARLRPDGKKAETGEKFGKRTLDA LEELREQRVKQLASRIAEAAALGIGKEHVFP TAKEPQKKCWCGSVHRK KDPKRPRERVHSPCHAVVIENLTHYRPEETRTRRENRLMSWSSGK VKKYLAECQLNGLHLREVNAAYTSRQDSRTGAPGIRCQDVPVKEF MRSPFWREQVAQAKKKQAEGKG DARERFLCDLDEQWKNRSEDE WKKAGPVRVPLRGGEIFVSADGTSPTAKGLHADLNAANIGLCALT DPDWPGRWVWYVPCDPASFKPIMDKVEGSAVQPDQALRQPAQA QRGDAARDRKKRGKVGGRSREVNLWRDVSSRPISPNDSWQEFT PYWNDVQARVVNLRQSAGLTRGQGEP
116	Cas12	MPLRSINIKMRLKRAAEGRALRQSLWLTHSVVNCVAEIERVLLCR GRGYWTGDDEPVSAETVQQALAFARETQARNGQPGIGGDAEIL AALRGLYEIVPSVNRDEQGRPLEGNAQAAGGFAGPMMDAESEG FQSVFDKILEPLPSWVAKMTGGTRGWEQESVQWLKSPESERLQHA SGSPPAWVRRRLTGEPWQEAQVQDQENKRKEVKGVPSLIQRLKKE LGLLPLMRPPITLQFEDKRSGLTPWDRLTLRLAVAHLLSWESWNHR AADEHGRVTERLARLETEAAPLASLIEGLREYEKIRHEELKRVAQAND ENPFRIGARGVRGWDRVREAWLGATDDTKEGRFTSVAALQTKLGG RFGDPDLFRWLAEEGREHLWGEHDPLPILARLNALSRLRRKKDHAI YTAPDARLHPRWTAYEAPGGGNLRNYSFEISGNDLALRLPLLRVES GLEEDSQRAEIALAPSGQFQSASWKGDGKPNRHLTYSAHEQFSAE LGGAEILYRRRHLENRKVKELEQGDIGPVWLKLVLDVQPNAPGWF TPRGRVVTPTVHHFNTALVNRSKHAPDLVPGLRVLAVDLGVRTFA ACSVFELVQGEPPNGMAFLADQERDLWARHERSFLLPLPGEAVDS

		QLLAARRAAYNQLGLLRDLGRLKGILRLSVKETAENRCGSLEELLAS LEDEWNRGNAPADVAALLSAKGCLEMPQPAWEAAIAGTYQAAER ELGNRVRDWRRTTRPTTGEDRRQRRGYSGGKSAWAVEYLDQV RRLQGWSLHGRSYAQIRRLDREKMGTFAGLLDHINALKQDRVKT GSDLIVQAARGYLPTGKKGWIKQYEPCLILFEDLARYFRFTDRPRE NARLMRWNRHRLTETELQAEIFGLLIGTTGAGFSSRFHARSGAPGC RTRLLTAEDLRSPTLAKQLELLAETQGIDPKCFRPGMQIPWDSGADF VTLDSEGKLVQIHADVNAQNLQRRFWTRFRDAYRISAVEIKQDGR TSWYPDREGVRLRGALSTIVGGDGYARLVAADDDDDGVLEKVTRP HWRRAAGAAQESGDDVGLDEVALEMAEAMDTDLERGEGRVFFR DPSGSVIRADRWYQAKAFWGQVRSRVTRALGLRRPGASS
117	Cas12	MLDKFASLYPVTKTLRFRLLPQGRTEENMQVAKVLENDLERSEAAA VVKGLIKKYHLQFISDTLSGSTLSWQALTETLDKFKADHTATAELDSA LAAYRCKLAELFTKSPKYKVMATPVSIIEILKTETDPENIAALNKLNG YTYIIFDYVSTRMLTYSADAKATSLAYRLVDENYLRFYQDISAAAEISA VLEEAGFDNAEVEAFIRTDYNTCLTSEGIASFNAAGSINQFVNVL QQNPVLQSEPALRRHLQPLYKMMLDEAESKIIKFEDYGQLRDAVENF RRNFQDLPQSLIDIFAGRYDYSKIYVGKYLNASSQIAGGYNWKLE NALEDIFYSKPYLVNGKLPVKYKTVVNKKMNQLAYSFTELQEALDAG DSGSITDLFGKYAELHAAYAAADGNVIFYKEYDRKSIASLKNYLDV NAIARFIKFAAPEVYVKDEGFYGIVDGAADKLRFDDLNNMVRNYIT KKPYKKSVALTFNSSSFGRGWDENKIYDELTTIFTYNGKYLVGVINK NDKPDAAAVSKDEGGYKRMVYKTFDIVKQLPRLSFTKAVKAHFAE SDEDFIDGPKFAKPLRVPKEIYLQSFTDNGDKLADSAKKYTKAYLD MSGDYKGYEAIKRIDYTKELFSAYKSTSIYDLAFLKPAGKAAGSLCW TRHI
118	Cas12	MSRSIFSPFTNLPIQKTLRRELKPLNENFQHDPALSALRNSEIPQRD EQREKDYQAIKPLLEFHNQFITESLHLEPQDRSDFILFYQTYQKKK KNKAEISEKELKSLDEEFESRTKALRNAIGTSFSVTAE LRKSNPDYVSE KGKPFLTQKSYKILTEAGVLWLEKKYTSDEKALIRRFNGFFTYFTG FNQNRENYYATDEKSTAVAYRAINENLLTFANNCELFELSVLSSEL EKKTFNPDSYSEYLTQSGIVFYNEMLANIRSKANLYTQEHKAKLPQP KLLYKQIWSRPGDTIPFDLIASEAEFQETLHTMIRETDQRIPEFNKLE QIFEEKVDLSQIFFSKTSLNIISNRYFSSWHTLLEKGVLEKLFKKNDE ESFKLPAYLSLAELKELLESAPFQMAEKADADEEKHHQASLFLQRE NLHLEKSHSNWELLKSMKSDFESFWTWEGEFWSYTLAKKALQSLS ALESTNQEHNLIKMLLDNALYAYRMLKWFKVDTSKLG FVPEGEFY

		PSLDQLLDYPLPKWYDMIRNYLTRKTSQAKLKNFDCSTLLNGRD KNKEIQNLSVILRKDGKFYLAIMKKDQNKFFENSALYEGNLGTMEK MDYKLLPWANKMLPKCLMPGSDKKYGASDQVLELYAKGSFKKSE KSFNLADLHTLIDFYKLALPKYEDWKVFNQFQATENYQDISQFYRE VEQQGYLLNWRKVNEKLIKQGIKDWSLFLQISSKDFEGKSKTPDLQ TLYWQQLEFEFSTNVKLNGEAEIFFRPWSMKKEKKLKVNDYDVFH KRYTEDKILFHPITLWFGNNEVSPSAPSKFNQKLNQELIIPHFDLH VIGVDRWEKHLAFYSVSVSKTGKIVKQGTNLNNGTDYEAKLSQKAE NRLHARQNRDTIEKIADLKNYISQVVNKLVELVLEYNVIVFEDLNA GFKRGRQKIEQSVYQKLELALAKKLNFIKKKEKAVGEPWSVTSAYQL APQINTFWDIKWKQRGIMLYTRANYSVTDLTGWRKQYFYFKKGS SEEMKAQFFKSKNLTRDAGQEAYIFDDGTWLLYSNVERRRGKRGD HRERTQIKYDPSLELDTLFSKYQIEKSDSLFDQLKNRELQTFWTSFFR IIDLIMQIRNTDDEGRDIILSPIGNPQERFDSRKRYNQLPRDEKGGIIE ESAFEYPTSWDANGAYNIARKGVMMLERIKENPEKPDLLIRDAEW DKKITRK
119	Cas12	MKNFQDFTNLYELSKTLRFELKPIWGTKKLIEKNILKLDKKKRENYEK VKPYFNKIHQEFINFALRNPNFDFSQFEKYLNWLKDKKNKDLLKEK ESIDKIFLEKIWKLFENSVKDFLKENGFEIVKSEDQNLKFFRRKEIFEV LQEKYGSELETQMVNKDWEIKSIFNGWEKWLWYFDKFFNTRDNFY KTDWTSTAIATRIKDNLKIFLENTIIFEKVKNKKIDFSEVEKNFSVSIDT FFEINNFNNCFLQDWIDFYNKVIWGETLENWEKWLWNEIINKYRQ DTGEKIPYFKKLQKQILSEKDWVFDKIEDDGGFYEVLNFKYKNAAEK EWFLKNIFENFYTISDNLEKIYFNKIAFNTISHKFWSALEFERILYEEM KKEKADWIKFEKKENKYKFPDFIQIIFIKRSLNYSNLFWKERYYKS EENVDFLEKNNNNIWEQFCKILNFEFLNILKRRIDEAWEEYEVWF EISKNILWEKLENFELNQENKWIIDFADYSLALYSFWKYFAVEKWR NWDLNIDISDDFYGWEDWYIEKFYNTGYDEIVKPYNLMRNYISKKP WEDSKKWKINFETSSLLSWWDKNLESNWSYIFQKWNKYIWIINW SKPAKEVLEKLYSWNGEKIKRFIYDFQKPDNKNTPRMFIRSKKDSFSP AVGKYNLPVEDILEIYDNWLFKTENKDNSNYKESLSKLIDYFKLGFSK HESFKHFNFWKDSKEYENIADFYRDVEKSCYQITSEFLDFEELKKLT FKKHLYLFQJYNKDFELDESQKNWYNFRDEWQKNIHTKYFEALFLE ENILRKSWAVFKLSWGWVFFRKESIKAEKEKRKNIEVTKNRRYTEE KYFLHFPIQVNFKNEISWNFNQEINKFLANNPINVIWIDRWEKHLA YFSVINQKWEILESWSFNKIENYNKNWEKLLFPEREIKEIHKDWSLID LELVETWRKVDYVDYKLLLEYKERKRLLRQSWKEVEQIKDLKKWYI SALVRKIADLIKHNAIVIFEDLNFRFKQIRGWIEKSIYQQLEKALIDKL NFLVNKNEINLEKAGSILKAYQLTPVDSLKEIWKQTWVIFYTEAAYT SKIDPIKWWRPNLYLKKQNAEINKENILKFDNIIFNSKENRFEFTYDLK

		KFFWKDSKFAKTVNTVCSCVERFKWNRNLNNKWWGYIHYENLTD WKLANKKEQKEDEFSNFKELFEKYFIDINWNILEQIKNLDTKNNEKFFS SFIDLFTLVCQIRNTNQNAKWDENDFILSPVEPFFDSRKSQNFWKSL PKNWDENWAFNIARKGLIILNRISENPEKPDLLIFNADWDNFARNI
120	Cas12	RPGASAALSLTPLKTLFSENFSSFMCGNWQIINDSLKTYNENIKSKG KAKEEKVKKAIAIEYKSLADINQLVERYNNDELNRKAEYISAINEKIK DLDVNEIEYDEKINLIENETKSEEIKSKLDSIMEIMHWTKMFIIIEEIEK DVNFYNEIEEYDELQPLVTIYNRIRNYVTQKPYSEEKIKLNFGIPTLAN GWSKTKEYDNNAIIMIRDGKYLGIFNAKNKPKKIMEGHQSEENG DYKKMIYRLLPGPNKMLPKVFMSKTGIAEYKPSQYILECYEQNKHIKS DKNFDIKFCRDLIDFFKTSINRHPEWSKFNFKFSETSEYEDISTFYREV EKQGYKIEWTYISEKEIKELDENGQLYLFQIYNKDFSEKSKGKENLHT MYLKNLFSEENLKNIVLKLNGEAEVFRKSSIKKPIHHKGSVLVNKTY NENGERKSIPEEQYTEIYKYLNSIGTNELSEKSKKLMEEGKVEYYKAN YDIVKDYRYSVDKFFIHLPMTINFKAAGFSPINNIALKNIALKDDMHII GIDRGERNLIYVSVIDTKGNIVEQRNFNIVNGIDYKEKLKQKELDRDN ARKNWKEIGKIKDLKEGYLSLVVHEIAKLVVYNAITMEDLNQGFKR GRFKVERQVYQKFETMLINKLNYLVDKDLAVDQEGGLLRGYQLTYIP ESLKVLRQCQGYIFYVPAAYTSKIDPTTGFVAIFNYKGMTDKDFVTSF DSIKYDDERGLFAFEFDYENFVTHKVEMARNKWTVYTYGERIKRKF NGSWDTAEKVDLTQYQMRISILEKYEIEYNKGQDILEQIEELDEKAQNG ICKEIKYLVKDIVQMRNSLPDAAEDYDAISPVINNNGEFFDSTRGD EDKPLDADANGAYCIAKGLYEVMIKKKNWNEETEFPRKELKIRHQ DWLDFIQNKRYL
121	Cas12	MQCGSLRHNSKSLDSALAYPARLTTGGNEGKTSEAHENDSLPEITR RPSRLARDFAPSNPPFMKRIYQGQITGMQFHGAAGEQAVPANQ NWEQALWDHGHGLFHDVNNYLVCLLALARPGNPVYAIREKLDHNN GAEPDELMVWRTFRRRGCNRPGLRDSVAKYLTPGNDEPTTEECFA AVLAGNPLGATEEGRAILNEGLAQLLGKCTGESGCRNSAKEYLPRFT KPDFKGNFEEDTARLNRAEASKRLPFYLHDPATTPNSPALDEFGVLSI ALPNPKRAELTGAEARDKLEFSREWSARLPDGSADWRRLEAKITAL GDSLAIPGYTSGSAKGENRFQLYAMFLFCFVEKSDFTLGLLRQTTRR PVEGEEPPPRS NHSATAGDPIRIARGGRGYVFRAFTSLKQWGGDTG GDLKWPKFDMAAFCEALKALHQVEAKAKQRAEERSKKQALLDYQR GRIRRFKPTANSEDATPPPVLAGDPRISRLEQLLNTDLQDEYEMSEG VAVAYGLHPRTIRGFREIRKRWISAVGNAPFSEAARATLIACVRSFQS ENPGTVGSARLFEALAEESNWIIWREPSAAEQQSWRENADLPESAE

		FALDPLQALTDERELKDEIERLSGPIRFTPADAHSRRQFYFSDVSQID KRNRFPRRLNEVEVELAVRPNGHWTNVVWVTLQYSAPRLLRDQLPT ADEAGGGWQQAMMAALNLRAPLKKGGEAVSFADCAALSLMPDI SPDGEKRLLLNFPVELDGEAIANQLGRSKRWETLQFGGADDES YWL RWPKTWIDETKVRRAAPPKWWLSKEPFSVLGVLDGQRDAAACA LVQVSPGNCPTGVCRHVGSADGVDDWWATVRSMMNMLRPGENA KVMRDGRFQEELSGSRGRSASIDELKEAGDICARLGFVADTILGANG RALSFPELNDRLFLSLRSAQSRLARLQSWSCVAHADVPPARREGILR DISEAKDDPLGLKPLATAGNLEAIASTLREVILQERTSISAQLVRVADR ILPLRGRRWEWVARPESPSNHMLRATAPDTPRRKLAVAGQRGLSL ARVEQLESLRQRCQSLNRLMQVPGTPSKLGRRSRGVELDPDPCDL LDRLDALKEQRVNQTAHLILAQALGVRLRIHQVSGPQRTRSDSHGE YERIPGREPVDFLVLENLDRLASQGRSRSENSRLMKWCHRAILLKL KQLCEPYGLRVLETPAAYSSKFSSRDGTAGFRAVEVTPDDLGS HRW RKHSERLADPGASLSRDEREESTRLMAFAERLKALNQDLIARQE AAR SSNQPFPRKWRTLLAPQQLGPIFVPAVGKPLQADINAAINIALRAIAS PDVDDIHLRIRAARSGDKFVVRAENTRERARWGSAEAEIGLPTGAG AKEIEERRSLLTEARVNFFDPASVAAFDHGKVRDAKLAVTSGRGLW GTLRREEWAIVGKINNDRLAAHGLGRPFAERVDL
122	Cas12	MSQRDPLPSPTPRAYTLRLSTPDADNGAWRERLWKTHEVNVSGAE AFGDWLLSLRGGLDHRLLVAVKVRVGRGASKTEREPTEDERRRIVL ALCWLSVESKKGAPQGRVVEDPVDALKRILGQRGLSEADAEQWVF DCRDLSATIRDDATWVDRSAAFDETQVRLGSSLTREHAEQVIEFF GDIHDYLALPKNMEEDGVTSPRGGSGKEFRTQARSWLSENWGAG QKGDKAQIVDALRKCSRCIAQEKPGSTGSDLLRVLRSLGGSPEETLRF DELRKLVGWRTGRRSTGAFALQRTVDMDRLESDESLEAKLTVEID AKSPEASRSVPQWVESMRTAVEREVGMPFRSTRDLIGEFVMLDH AARRVSATHSWIKRAEAERRKFEGDAAKLAQIPEEARQWLDQFCE DRSQELNALEPYRIRRRRAVEGWESVVRTWAKADCKAEGDRVKAVR ALQPEIEKFGDAALFEALAAEDALCVWLLDGKATPRPLLDYSAATDA QYRKRRFKVPAYRHPDALLHPVFCDFGESRWTIEFSAHRALGRRRK AQQLVDNKTVALQKAQERLRKAKAESSRSRAEEKVRAAEHALEAAR KKLAFQYRRALAVCLWTGKGVESTSLRWHSKRFAKDFAI GSSPED GASTGVPVARADRLGRASANVPRGASVTISGVFEQKEWNGRLQAP RDALNAIAKVRDDETLPAADRSRRVQQMLSRLPWVFTFSARLV PQ GPWLDYASEHSALGLRVDPKYWPHAEENRQRKGMARLILSRLPSLR VLSVDLGHRYAAACAVWETLSAQEMQRICREMGSAPPSPDDL YLH LRRADGNGKQRTTVYRRIGPDTLPDGGQHPAPWARLDROFLIKLQ GEDESARKASDSEIAVVKKFEADLGRPAMQRRSLRVDDLMSAAVRT ARLALRRHGDRIARAFNLIADRRFRPGGAEEPLTDETRVDLLADTLA

		TWHGLFSGGQCHDERAEEQWNEHIAPLLASSGASLSVPSDGDVA ATPARRRRKEVRGKLVPAAMELARRDLSQLSVLWVARWHQDDES WRARLRWLRDWILPRGAKADSGAIRHVGGLSVTRLATIRSLWQLQ KAYRTQPEPEDPRKNVPKKGDTSLDDFGRTILDDLEHLRENVRKQLA SRICEAALGVGVEQPNGGAKDPKRPQERRFSPCQAVVIENLTRYP EETRTRRENRLNWSAGKVKQYLSEACELHGLHLREVSAAAYTSRQ DSRTGAPGIRCQDIPVVDVRENGPCWGRLSAQSSGGTAEDQL LLALYERWSEKERTWRDQSGNVWAMDGEGRWVARNGTQLPQG SGLTPHPIRVPQRGGDIFVSAAPRSPAANGIQADLNAAANIGLWAL LDPDWEGRWWRLPCSAMDLPVKGSVNGSAVIHLDAPLKAAATK GAAKKDVVNLWRDISVRSLTEGVWRGYDAYWNLARYRVVQTLRP QVGIGSDE
123	Cas12	MFKGDAFTGLYEVQKTLRFELVPIGLTQSYLENDWVIQKDEVEENY GIKAYFDLIHKEFVRQSLNAWLCQLDDFYEKYIELHNSLETRKDN LAKQFEKVMKSLKKEFVSFFDAKWNEWKQKFSFLKKWWIDVLNEK EVLDLMAEFYPDEKELFDKFDKFFTYFSNFKESRKNFYADDGRAWAI ATRAIDENLITFIKNIEDFKKLNSSFREFVNDNFSEEDKQIFEIDFYNNC LLQPWIDKYNKIVWWYSLENWEKVQWLNEKINNFKQNQKNSK DLKFPRMKLLYKQILGDKEKKVYIDEIRDDKNLIDLIDNSKRRNQIKID NANDIINDFINNNAKFELDKIYLTRQSINTISSKYFSSWDYIRWYFWT GELQEFVSFYDLKETFWKIEYETLENIFKDCYVKGINTEQNNIVFETO GIYENFLNIFKFEFNQNISQISLLEWELDKIQNEDIKKNEKQVEVIKNY FDSVMSVYKMTKYFSLEKWKKRVELDTDNFYNDFNEYLEGFEIWK DYNLVRNYITKKQVNTDKIKLNFDNSQFLTWWDKDKENERLGIILRR EWKYWLWILKKWNTLNF GDYLQKEWEIFYEKMNYKQLNNVYRQLP RLLFPLTKKLNELKWDELKKYLSKYIQNFWYNEEIAQIKIEFDIFQESKE KWEKFDIDKLRKLIEYKKWVLALYSDLYDLEFIKYKNYDDLIFYS DV EKKMYNLNFTKIDKSLIDGKVKSWELYLFQIYNKDFSESKKEWSTENI HTKYFKLLFNEKNLQNLVVKLSWWADIFFRDKTENLKFKKDKNGQEI LDHRRFSQDKIMFHISITLNANCWDKYWFNQYVNEYMNKERDIKII WIDRWEKHLAYYCVIDKSWKIFNNEIWTNLNWNVNYLEKLEKIESS RKDSRISWWEIENIKELKNGYISQVINKLTELVKYNAIIVFEDLNIWFK RWRQKIEKQIYQKLELALAKKLNLYLTQKDKKDEILWNLKALQLVPK VNDYQDIWNYKQSWIMFYVRANYTSVTCPCWLRKNLYISNSATK ENQKKSLSIAIKYNDWKFSFSYEIDDKSWKQKQSLNKKKFIVYS DIE RFVYSPLEKLTVIDVNNKLELFRDFNLSLDINKQIQEKDLDSVFFKSL THLFNLILQLRNSDSKDNKDYISCPSCYYHSNNWLQWFEFNWDAN WAYNIARKGIILLDRIRKNQEKPDLYVSDIDWDNFVQSNQFPNTIPI QNIEKQVPLNIKI

124	Cas12	MLSFNWVLFSSKMSRSIFSPFTNLYPIQKTLRRELKPLNENFQHDP ALSALRNSEIPQRDEQREKDYQAIKPLLEFHNQFITESLHSLPQDR SDFILFYQTYQKKKKNAEISEKELKSLDEEFESRTKALRNAIGTSFSVT AELRKSNDPVSEKGPFLTQKSYKILTEAGVLWLEKKYTSDEPKLAL IRRFGNFFTYFTGFNQNRNYYATDEKSTAVAYRAINENLLTFANNC ELFEKLSVLSLSELEKKTNPDSYSEYLTQSGIVFYNEMLANIRSKANLY TQEHKAKLPQPKLLYKQIWSRPGDTIPFDLIASEAEFQETLHTMIRET DQRIPEFNKLEQIFEEKVDLSQIFFSKTSLNIISNRYFSSWHTLLEKGV ELKLFKFKNDEESFKLPAYLSLAELKELLESAPFQMAEKADADEEKH HQASLFLQRENHLEKSHSNWELLLKSMKSDFESFWTWEGEFWS YTLAKKALQSLSALESTNQEHNLIKMLLDNALYAYRMLKWFKVDTS KLG FVPEGEFYPSLDQLLDYPLPKWYDMIRNYLTRKTSQAKLKN FDCSTLLNGRDKNKEIQNLSVILRKDGKFYLAIMKKDQNKFFENSALY EGNLGTMEKMDYKLLPWANKMLPKCLMPGSDKKKYGASDQVLEL YAKGSFKKSEKSNLADLHTLIDFYKLALPKYEDWKVFNFFQFQATEN YQDISQFYREVEQQGYLLNWRKVNEKLIKQGIKDWLSLFLQISSKDF EGKSKTPDLQTLYWQQLFEFSTNVKLNGEAEIFFRPWSMKKEKKKL KVDNYDVFKHKRYTEDKILFHPITLWFGNNEVSPSAPSKFNQKLN QELIIPHFDLHVIGVDRWEKHLAFYSVSVKTGKIVKQGTNLNLLNG TDYEAKLSQKAENRLYARQNRDTIEKIADLKNGYISQVVKLVLELVE YNAVIVFEDLNAGFKRGRQKIEQSVYQKLELALAKKLNFIKKEKAVG EPWSVTSAYQLAPQINTFWDIKWKQRGIMLYTRANYSVTDPITG WRKQYFFKKSSEEMKAQFFKSFKNLTRDAGQEAYIFDDGTWLLYS NVERRRGKRGDHRERTQIKYDPSLEDTLFSKYQIEKSDSLFDQLKNR ELPQTFWTSFFRIIDLIMQIRNTDDEGRDIILSPIGNPQERFDSRKRYN QLPRDEKGGIIEESAFEYPTSWDANGAYNIARKGVMMMLERIKENPE KPDLLIRDAEWDKKITRK
125	Cas12	MLDKFASLYPVTKTLRFRLPQGRTEENMQVAKVLENDLERSEAAA VVKGLIKKYHLQFISDTLSGSTLSWQALTETLDKFKADHTATAELDSA LAAYRCKLAELFTKSPKYKVMATPVSIIKEILKTETDPENIAALNKLNG YTYIIFDYVSTRMLTYSADAKATSLAYRLVDENYLRFYQDISAAAEISA VLEEAGFDNAEVEAFIRTDYNTCLTSEGIASFNAAGSINQFVNVLL QQNPVLQSEPALRRHLQPLYKMLLDEAESKIIKFEDYGQLRDAVENF RRNFQDLPQSLIDIFAGRYDYSKIYVGYKYLNEASSQIAGGYNWKLE NALEDFYSKPYLVNGKLPVKYKTVVNKKMNQLAYSFTELQEALDAG DSGSSITDLFGKYAELHAAYAAADGNVIFYKEYDRKSIALKNYLDV NAIARFIKIFAAPVYVKDEGFYGIVDGAADKLRFDLNLMVRNYIT KKPYYKSKVALTFNSSSFGRGWDENKIYDELTTIFTYNGKYLLGVINK

		NDKPDLA AAVSKDEGGYKRMVYKTFDIVKQLPRLSFTKAVKAHFAE SDEDFIFDGPFAKPLRVPKEIYLQSFTDNGDKLADS AKKYTKAYLD MSGDYKGYEAIKRIDYTKFLSAYKSTSIYDLAFLKPAGKAAGSLCW TRHI
126	Cas12	MNRIYQGRVTKVEILNGKNADGQPQELPNWQTALWQHHELFQD AVNYLFLCLAALASSASSPMGKLRNQLGSVWEPFGRTGRRFKGLRD SVGPYLLPDRPTPSIEEAF AALAGNNSQPELLQLAVDALVEDLGGD AAIQQEGRGYLPRLCSPAYNGQFPRGANS LQKEAAKIRLPTLLHNVA TSRNLDA LAEELEFGFFANPVPNAGPIAGQEARNKLEALAWLKAK DTRLTHSANELEKRIGVLPDSVSFPTYSGGSINKEALKHRFFAYLLFQ HVERSLVTFEILRDSYTPKPSARKSSKATPDTMAQLTQFGDDPVKL ARGTRGYVFRAFTSLPCWGAKAPSDILWSEFDIAAFKEALKTANQFR LTKERLDKADELAGE LAWMNGEKSFKPSEHSEQEPPAVLKGDPR FEVLKQLFEVELAE EHYLAEGESVIYGLHPRTLRCYRELVERWNKTQV PGEVTFEATSKKL VASTDKFQAENKERIGSVTLFKLLERDYWCLWQ TPDVQTVAARQKAGFSSNIEDYQRYLELQTDIARLKEPIRFTPADAE QSRRLFMFSDLAGSKSKHKL PNATPYGFAVDVALAASEGGVWKET RVRLHYSAPRLRRDGLRKGVGEDLKRTAWLQPMVAALNLSEPAQ DFSKCAVSLMPDKSWKGLRHLLNFPVTL DPTVVQKAIGSQARWAN QFVAFGKGATEQKFFLRWPEEVSASQK KAGPWWDALRAFSCLSVD LGQRDAGAFALLDVRANADWGKKPSRFIGEADGRNWRAALAAAG LLRLPGEDALVWRD GKWQEELYGEKGRLATKEEWLETNAIFSALEQ NSEEWIGADPKRRSFPELNSKLLV VARRGQSWLARLHRWLWMLG DENKRERALRELEQERQEAWRKRAEGKDLLALKQSLTAEIQRNLGL LPEQLVFLANRCLPLRNK WAWNQHPDKAFAEKGC HLLMEVAPS HLPLLAGQRGISFERIGQLEELRRRFQSLNRVLQREL GAPPKSGREL R DDLVPDCCPDILAKLDRVKEQ RVNQTAHLIVAQVLGVQLRKHQTP E SERTERDLHGEYEIMPGRKPVDFIVLEDLSKYLSSQARGGENVR LM KWCHRQVTAKVKELCEPFGLPVLETPAAYSSKFCSRTGVAGFRGVE VTLKDRQSF PWSKRLEEDSAEVAELFGWLETASAGHKTKQPRCLLA PMSLGPLFIPVTSQAPIMQADINAAINLGLRAMAAPS VHEIHVRIRS EAKDGQFRVRAQSKREKARWGN EPPPIKMLVETQRVALAREGGH PNFFVDPLKAATFDRAEVEGLGLPVASGRGLWKSVRDAEWKRCREI NLERMRRWGFIMEAPRTLQVSRKEDEDDLTF
127	Cas12	MAVRSVKLLLVPRDGS AESVRKRKALWATHQFVNDA A AAYAE LLL EMRQEDVCRGTDDHGKDVIEPAAHWQAKLRARLA AKQLPPVAVA EALPLLKAFYGSRLIKSFVANDKGVAGTGNATDLNTWLSGLVDPASV

		AGEKTELKQLLAELPLCEAADADFEAARKMLAKSDAREALLEG GTGVGWPAAYNANPTDSVWLDMLHKAARLEADTTVSELKK LGVFPLLQAASSNRVFGSGVLNPFERMAAAQAAAALLPWETKRHE MRKRRDKFADQLNQWDETEFGASHATALAAIRAFEAEESERARRESL GNEGTGYRIGGRELDAWTLLRDWLKGHSTATAAAREDKVRELQA KQGRSFGSHRLLSWLAKPAQQWLADHSAGDVVTRIAVRNARQRK LDTARTLPIWTGADAVKHPRFANFDPPNNTNQPGFDLRAGTQKGR LTLRLSLLTERADGLLLAQDHDFQLVPSRQMAEIVLHKDGKERALS WSQSDGIGRQVGDVGGSSALLFSRDHAECLLERKQITRLERGAWPAAL PVWFKLSLDIGAHEKALLKQRFKWGVWLNLSALVTRNAKDAKGVP PVGTRVLAVDLGLRSAATVSVWQVVDAAATPVVAGKWRVPLSDT LSAVHERSAMLALPGEHVDAGVLAARRAANEKLAGLLAATSHLSTV FKLGRAEQGDRRRELLERLGEEDRRARAATAAERDGLRAVLGA TQDAWAGAVAAVWRRLETLAGAIAAYRKQQRQREDVQLRREARHG PGASQLPKQAAERLLGGKSAWQIEYKERVRLKLLTRWIMRQRP GDTAVRRLARKDLGKYCGGLDHLTALKEDRAKTADLIVQAARGVR VAHKDAHGRQQDRELWLAKYAPCDLIVMEDLGRYRFATDRPPSEN RQLMQWTHREVRLVQMMAEVEGIQVLETGAEFSSKFDDARTWAP GVRCEPITKLWVERYRNGEMPWLADKADEWRREGIELAQLVPGQL LPTGSGEQFVAVSATGGLRVRHADLNAAQCIARALTGHGTAFRL TARRLGDVFSAGLGLKRPQALWREFGSALPPAVVVLPRPAGEVRY ALRPFASARDAALGLQLGALRNVDATDAESDAEDGDLAELLAGA DPPDRATFFRDPGSDVHGGAWVQAKVFWAEVRRHVRLLGLQAQGL LPPAAARSSEPRQMLPLAGALPGDDIPL
128	Cas12	MSTQKNPFNQFTNLYELQKTLRFELRPVPETKKLLEKGEKGNLIQ MDLEIDRLYEKEMKPMFNILHEKFINESLGLVKLDCKKLKLENLLA EADKLKQIKQGRKNKNNISEVEKRLKIIIGDNSQGKNKNGEIAVLQ DELRLIVKAFNLTAADKWKELNNKETLLPEKKGKRKIKIKSGPKIL QEENVLAILAYFNPDKADIIKKFAGFFTYFSGFNQNRANYTTVKAL ATGVANRAINRNFLIFLANRKDFARFKERLPRLAEFDNYFELENYE KYLSTGTGIEEYNDQIGKIKQIVNLEHNQQQKDNKFQLKGLATLEK QIGCRTKKQREEGGDKSAPKFLEKVGLGFQVSQDDDGELYIWECL NYINKELAGKLKSIKDNYQKFFADWRTGAYDLEKIWFRKEALNTIS GRWFGGNNWFIIGKALALTGVGKFDKRENTYKIPEFVSLAEIKTAF EMLENGVNYDFKSKKKKEGDDTDVVKYSADNLFKEEYKKKGLIKNS LFETMLAVWQSEIKRKFEQIFDGYKLEKDDVFGRKKGEWVEPFIE NFQKVSQEKFDRGVKDENGRSIHTEVVKNLIEEGYLRLFQLTKYH NLDKKGERDPRPFDGNFYATLDEFWKDNIVVYHKAQSTLTKKPY SEDKIKLNFENGSLGGFSDGQERSKAGVVLKNKNKFYLGILIDR GFFRTDKANPVYDNAQNNEWERLILTNLKFQTLAGKGLGKHGVS YGEMGKDNPMMAVEYLQKF

		IKLYLDKYPALNEVAHKKYTIKKEFDADVKNALKDCFTMNFKPVDF GMIRQGLTESLFYLFYFEIVNKDISSQAKNGKNVHTLYWEALFGDQNLK KPILALNGGAEIFYRESQREKLEKKLDKSGKEVLDHKRYGQDKYFLHA SITINYGQPKNIKFKEVINEKISQNADRVNIIGIDRGEKHLLYSVVSPE GVLEQGSFNQIETKNKVDIKAVKAEYGERGELKKVELVPTGKKVKY VDYQILLDYYEKKRNLAARDWQTIGKIKDLKDGYLSQTVHRIYQLLK YNAVVMEDLNVEFKAKRAAKVEKSVYKNFEMALAKKLNHLIKDR RADEIGGALRAYQLTPAIPANDVGKFDKAKQWGMIFYVRANYTSTT DPLTGWRKHKYISNSEKIDNIQKFFSPGDGIQIDYDTEQCFKFSYDH ELEGGAKKHWELFACDGLERFYWDNRERQIKYNLYEEFEKLLGGL RKEENINIQIDGVSEFRWKDLVFFWNLLNQIRNTDRSAQGDENDFL QSPVWSEKYNCFYDSRKAPNNMPNNGDANGAFNIARKGQLILERI KKCSDIPKFGNDNNGKNPENNYFISDADWDKFAQK
129	Cas12	MAVKSIVKLRLLDDMPEIRAGLWKLHKEVNAGVRYYTEWLSLLRQE NLYRRSPNGDGEQCDKTAEECKAELLERLARQVENGHRGPAGS DDELLQLARQLYELLVPAIGAKGDAQIARKFLSPLADKDAVGGL GIAKAGNKPRWVRMREAGEPGWEEEEKAETRKSADRTADVLRAL ADFLKPLMRVYTDSEMSSVEWKPLRKGQAVRTWDRDMFQQAIE RMMSWESWNQVRVGQEYAKLVEQKNRFEQKNFVGQEHVLHLVN QLQQDMKEASPGLESKEQTAHYVTGRALRGSDKVFEGWGLAPDA PFDLYDAEIKNVQRRNTRRFGSHDLFAKLAPEYQALWREDASFLTR YAVYNSILRKLNHAKMFATFTLPDATAHPIWTRFDKLGGLNHQYTF FNEFGERRHAIRFHKLKVENGVAREVDDVTPISMSEQLDNLPRD PNEPIALYFRDYGAEQHFTGEFGGAKIQCRRDQLAHMHRRRGARD VYLVNSVRVQSQSEARGERRPPYAAVFRLVGDNHRAVFHFDKLSY LAHPDDGKLGSEGLLSGLRVMSVDLGLRTSASISVFRVARKDELKP NSKGRVPFFPIKGNDNLVAVHERSQLLKLPGETESKDLRAIREERQR TLRQLRTQLAYLRLLVRCGSEDVGRRERSWAKLIEQPVDAAHMT DWREAFENELQKLKSLHGICSDKEWMDAVYESVRRVWRHMGKQ VRDWRKDVRSGERP KIRGYAKDVVGGNSIEQIEYLERQYKFLKSW FFGKVSGQVIRAEKGSRAITLREHIDHAKEDRLKKLADRIIMEALGY VYALDERGKGKWWAKYPPCQLILLEELSEYQFNDRPPSENNQLMQ WSHRGVFQELINQAQVHDLLVGTMYAAFSSRFDARTGAPGIRCRR VPARCTQEHNPFPWWLNKFVVEHTLDACPLRADDLIPTGEGEIF VSPFSAEEGDFHQIHADLNAAQNLQQLWSDFDISQIRLCDWGE VDGELVLIPRLTGKRTADSYSNKVFTNTGVTYYERERGGKRRKVFA QEKLEEEAEELLVEADEAREKSVVLMRDPSGIINRGNWTRQKEFWS MVNQRIEGLVKQIRSRVPLQDSACENTGDI

130	Cas12	MSTQKNPFNQFTNLYELQKTLRFELRPVPETKKLLEKGEKGNLIQMD LEIDRLYEKEMKPMFNLHEKFINESLGLVKLDCKLKKLENLLAEADK LRKQIKEGRKNKNNISEVEKRLKIIIGDNSQGKNKNGEIAVLQDEL RV LIVKAFNLTAADKWKELNNKETLLPEKKGKRKIKIKSGPKILQEENVL AILAYFNPDKADIKKFAGFFTYFSGFNQNRANYT TVKALATGVANR AINRNLIFLANRKDFARFKERLPRLAEFDNYFELENYEYLSQTGIEE YNDQIGKIKQIVNLEHNQQQKDNKFQKGLATLEKQIGCRTKKQRE EGGDKSAPKFLEKVG LGFQVSQDDDG EYLIWECLNYINKELAGKLKS IKDNYQKFFADWRTGAYDLEKIWFRKEALNTISGRWFGGNNWFIIG KALALTGVGKFDKRENTYKIPEFVSLAEIKTAFEMLENGVNYDFKSKS KKKEGDDTDVVKYSADNLFKEEYKKKGLIKNSLFETMLAVWQSEIKR KFEQIFDGYKLEKDDVFGRRKGEWVEPFIEFQKVSQEFDRGVKD ENGRSIHTEVVKNLIEEGYLRFLQTKYHNLDKKGERDPRPF DGNFY ATLDEFWKDNIVVYH KALQSTLTKKPYSEDKIKLNFENGSLGGFS DGQERSKAGVVLKNKNKFYLGILIDRGFFRTD KANPVYDNAQNE WERLILTNLKFQTLAGKGFLGKHGVSYGEMGKDNPMMAVEYLQKF IKLYLDKYPALNEVAHKYTIKKEFDADVKNALKDCFTMNFKPVDF GMIRQGLTESLFYLF EIVNKDISSQAKNGKNVHTLYWEALFGDQNLK KPILALNGGAEIFYRESQREKLEKLDKSGKEVLDHKRYGQDKYFLHA SITINYGPKNIKFKEVINEKISQNADRVNIIGIDRGEKHLLYSVVSPE GVLLEQGSFNQIETKNKVDIKAVKAEYGERGELKKVELVPTGKKVKY VDYQILLDYEEKRNLARRDWQTIGKIKDLKDGYSQTVHRIYQLILK YNAVVMEDLNVEFKAKRAAKVEKSVYKNFEMALAKKLNHLILKDR RADEIGGALRAYQLTPAIPANDVGKFDKAKQWGIMFYVRANYTSTT DPLTGWRKHKYISNSEKIDNIQKFFSPGDGIQIDYDTEKQCFKFSYDH ELEGGAKKHWELFACDGLERFYWDNRERQIKKYNLYEEFEKLLGGL RKEENINIQIDGVSEFRWKDLVFFWNLLNQIRNTDRSAQGDENDFL QSPVWSEKYNCFYDSRKAPNNMPNNGDANGAFNIARKGQLILERI KKCSDIPKFGNDNNGKNPENNYFISDADWDKFAQK
131	Cas12	MAIRSIKLLKTHTGPEAQNLRKGIWRTHRLLNEGVAYYMKMLLLF RQESTGERPKEELQEELICHIREQQQRNQADKNTQALPLDKALEALR QLYELLVPSSVGQSGDAQIISRKFLSPLVDPNSEGGKGTSKAGAKPT WQKKKEANDPTWEQDYEKWKKRREEDPTASVITLLEEGIRPIPLY TNTVTDIAWLPLQSNQFVRTWDRDMLQQAIERLLSWESWNKR VQ EEYAKLKEKMAQLNEQLEGGQEWISLLEQYEE NRERELRENMTAA NDKYRITKRQMKGWNELYELWSTFPASASHEQYKEALKRVQQRLR GRFGDAHFFQYLMEEKNRLIWKGNPQRIHYFVARNELTKRLEEAKQ SATMTLPNARKHPLWVRFDARGGNLQDYLLTAEADKPRSRFFVTF

		SQLIWPSESGWMEKKDVEVELALSQRQFYQQVKLLKNDKGKQKIEFK DKGSGSTFNHGLGGAKLQLERGDLEKEEKNFEDGEIGSVYLNWVIDF EPLQEVKNRQVQAPYGGVQLQIRRPNEFPKVTYKSEQLVEWIKASP QHSAGVESLASGFRVMSIDLGLRAAAATSIFSVEESSDKNAADFSYW IEGTPLVAVHQRSYMLRPLPGEQVEKQVMEKRDERFQLHQRVKFQI RVLAQIMRMANKQYGDWRWDELDSLQAVEQKKSPLDQTDRTFWE GIVCDLTKVLPNEADWEQAVVQIHRKAEYVVGKAVQAWRKRFAA DERKGIAGLSMWNIEELEGLRKLISWSRTRNRPQEVNRFERGHTS HQRLLTHIQNVKEDRLKQLSHAIVMTALGYVYDERKQEWCAEYPAC QVILFENLSQYRSNLDSTKENSTLMKWAHRSIPKYVHMQAEPYGI QIGDVRAEYSSRFYAKTGTPGIRCKKVRGQDLQGRRFENLQKRLVN EQFLTEEQVKQLRPGDIVPDDSGELFMTLTGSGSKEVVFLQADINA AHNLQKRFWQRYNELFKVSCRIVRDEEYLVPKTKSVQAKLGKGLF VKKSDTAWKDVYVWDSQAKLGKKTTFTEESPEQLEDQFQIEEAE EAKGTYRTLFRDPSGVFFPESVWYPQKDFWGEVKKLYGKLRERFL TKAR
132	Cas12	MRKKLFKGYILHNKRLVYTGKAAIRSIKYPLVAPNKTALNNLSEKIIYD YEHLFGPLNVASYARNNSRYSLVDFWIDSLRAGVIWQSKSTSLIDLIS KLEGSKSPSEKIFEQIDFELKNKLDKEQFKDIILLNTGIRSSSNVRLRG RFLKCFKEEFRDTEEVIACVDKWSKDLIVEGKSILVSKQFLYWEEFGI KIFPHFKDNHDLPKLTFFVEPSLEFSPHLPLANCLERLKKFDISRESLLG LDNNFSAFSNYFNELFNLLSRGEIKKIVTAVLAVSKSWENEPELEKRL HFLSEKAKLLGYPKLTSSWADYRMIIGGKIKSWHSNYTEQLIKVREDL KKHQIALDKLQEDLKKVVDSSLREQIEAQREALLPLDMLKEKDFSD DLELYRFILSDFKSLNGSYQRYIQTEERKEDRDVTKKYKDLYSNLRN IPRFFGESKKEQFNKFINKSLPTIDVGLKILEDIRNALETVSVRKPPSITE EYVTQKLEKLSRKYKINAFNSNRFKQITEQVLRKYNNGELPKISEVFYR YPRESHVAIRILPVKISNPRKDISYLLDKYQJSPDWKNSNPGEVVDLIEI YKLTLGWLLSCNKDFSMDFSSYDLKLFPEAASLIKNGSCLSGYYLSK MIFNCITSEIKGMITLYTRDKFVVRYVTQMIGSNQKFPLLCVLGEKQT KNFSRNWGVLEEKGDLGEEKNQEKCLIFDKDTFADAKAKEVEIFKNNI WRIRTSKYQIQFLNRLFKKTKEDWLMNVLSEPSLVLEEEWGVSWD KDKLLPLLKKEKSCEERLYYSLPLNLVPATDYKEQSAEIEQRNTYLGLD VGEFGVAYAVVRIVRDRIELLSWGFLKDPALRKIRERVQDMKKKQV MAVFSSSTAVARVREMAIHSLRNQIHSLALAYKAKIYEISISNFETG GNRMAKIYRSIKVSDVYRESGADTLVSEMIWGKKNQMGNHISY ATSYTCCNCARTPFELVIDNDKEYEGGDEFIFNVGDEKKVRGFLQK SLLGKTIKGKEVLKSIKEYARPPIREVLLEGEDVEQLLKRRGNSYIYRCP

		FCGYKTDADIQAALNIACRGYISDNAKDAVKEGERKLDYILEVRKLW EKNGAVLRS AKFL
133	Cas12	MSTQKNPFNQFTNLYELQKTLRFELRPVPETKKLLEKGEGKNLIQMD LEIDRLYEKEMKPMFNLHEKFINESLGLVKLDCKLKKLENLLAEADK LRKQIKEGRKNKNNISEVEKRLKIIIGDNSQGKNKNGEIAVLQDELRY LIVKAFNLTAADKWKELNNKETLLPEKKGKRRKIKKSGPKILQEENVL AILAYFNPDKADIIKKFAGFFTYFSGFNQNRANYTTVKALATGVANR AINRNFLIFLANRKDFARFKERLPRLAEFDNYFELENYEYLSQTGIEE YNDQIGKIKQIVNLEHNQQQKDNKFQLKGLATLEKQIGCRTKKQRE EGGDKSAPKFLEKVGLGFQVSQDDDGELYIWECLNYINKELAGKLKS IKDNYQKFFADWRTGAYDLEKIWFRKEALNTISGRWFSGGNWFIIG KALALTGVGKFDKRENTYKIPEFVSLAEIKTAFEMLENGVNYDFKKS KKKEGDDTDVVKYSADNLFKEEYKKKGLIKNSLFETMLAVWQSEIKR KFEQIFDGYKLEKDDVFGRRKGEWVEPFIEFQKVSQEFDRGVKD ENGRSIHTEVVKNLIEEGYLRFLQTKYHNLDDKKGERDPRPFDGNFY ATLDEFWKDNIVVYHKAQSTLTCKPYSEDKIKLNFENGSLGGFS DGQERSKAGVVLKNKNKFYLGILIDRGFFRTDKANPVYDNAQNNE WERLILTNLKFQTLAGKGLGKHGVSYGEMGKDNPMMAVEYLQKF IKLKYLDKYPALNEVAHKYTIKKEFDADVKNALKDCFTMNFKPVDF GMIRQGLTESLFYLFYVKNKDISSQAKNGKNVHTLYWEALFGDQNLK KPILALNGGAEIFYRESQREKLEKLDKSGKEVLDHKRYGQDKYFLHA SITINYGQPKNIKFEVINEKISQNADRVNIIGIDRGEKHLIYSVVSPE GVLLEQGSFNQIETKNKVDIKAVKAEYGERGELKKVELVPTGKKVKY VDYQILLDYEEKRNLRARDWQTIGKIKDLKDGYSQTVHRIYQLIK YNAVVAMEDLNVEFKAKRAAKVEKSVYKNFEMALAKKLNHLIKDR RADEIGGALRAYQLTPAIPANDVGKFDKAKQWGIMFYVRANYTSTT DPLTGWRKHKYISNSEKIDNIQKFFSPGDGIQIDYDTEKQCFKFSYDH ELEGGAKKHWELFACDGLERFYWDNRERQIKKYNLYEEFEKLLGGL RKEENINIQIDGVSEFRWKDLVFFWNLLNQIRNTDRSAQGDENDFL QSPVWSEKYNCFYDSRKAPNNMPNNGDANGAFNIARKGQLILERI KKCSDIPKFGNDNNGKNPENNYFISDADWDKFAQK
134	Cas12	MAQASSTPAVSPRPRRYREERTLVKLLPRPGQSKQEFRENVKKLR KAFLQFNADVSGVCQWAIQFRPRYGKPAEPTETFWKFFLEPETS LPNDRSRPFERRLQAFEEAAAGINGAAAALDDPAFTNELRDSILAVASRP KTKEAQRLFSRLKDYQPAHRMILAKVAAEWIESRYRRAHQNWERN YEEWKKEKQEWENHPELTPEIREAFNQIFQQLEVKEKRVRICPAA RLLQNKDNCQYAGKNKHSVLCNQFNEFKKNHLQGKAIFKYKDAEK

		YLRCGLQSLKPNVQGPREDWNKYLRVMNLKEETLRGKNGGRLP CKNLGQCEFNPH TALCKQYQQQLSSRPDLVQHDELYRKWRREYV REPRKPVFRYPSVKRHSIAKIFGENYFQADFKNSVVGLRLDSMPAGQ YLEFAFAPWPRNYRPQPGETEISSVHLHFVGTRPRIGFRFRVPHKRS RFDCTQEELDELSRTFPRKAQDQKFLEAARKRLLETFGNAEQELR LLAVDLGTDSARAAFFIGKTFQQAFLKIVKIEKLYEQWPNQKQAGD RRDASSKQPRPGLSRDHVGRHLQKMRAQASEIAQKRQELTGTPAP ETTTDQAACKATLQPFDLRGLTVHTARMIRDWARLNARQIIQLAEE NQVDLIVLES LRGRPPGYENLDQEKRRVAFFAHGRIRRKVTEKAV ERGMRVVTVPYLASSKVCAECCRKKQKDNKQWEKNKKRGLFKCEGC GSQAQVDENAARVLGRVFWGEIELPTAIP
135	Cas12	MAVRSVKLLLVPRDGSASVRKRKALWATHQFVNDAAYAEALL EMRQEDVCRGTDDHGKDVEPAAHWQAKLRARLAAKQLPPVAVA EALPLLKAFYGSRLIKSFVANDKGVAGTGNATDLNTWLSGLVDPASV AGEKTELKQLLAELPLCEAADADFEGAARKMLAKSDAREALLEGP GTGVGWPAAYNANPTDSVWLDMLHKAARLELADTTVSELKK LGVFPLLQAASSNRVFGSGVLNPFERMAAAQAAAAALLPWETKRHE MRKRRDKFADQLNQWDETFGASHATALAAIRAFEAEESERARRESL GNEGTGYRIGGRELDAWTLLRDWLKGHSTATAAAREDKVRELQA KQGRSFGSHRLLSWLAKPAQQWLADHSAGDVVTRIAVRNARQRK LDTARTLPIWTGADAVKHPRFANFDPPNNTNQPGFDLRAGTQKGR LTLRLSLLTERADGLLLAQDHDQFLVPSRQMAEIVLHKDGKERALS WQSQDGIGRQVGDVGGSSALLFSRDHAECLLERKQITRLERGAWPAAL PVWFKLSLDIGAHEKALKQRFKWGVWLNLSALVTRNAKDAKGVP PVGTRVLAVDLGRSAATVSVWQVVDAAATPVVAGKWRVPLSDTLS AVHERSAMLALPGEHVDAGVLAARRAANEKLAGLLAATSHLSTVFK LGRAEQGD RRRELLERLGE GDDRRARA AVATTAERDGLRAVLGA TQDAWAGAVAAVWRRLETLAGAIAAYRKQQRQREDVQLRREARHG PGASQLPKQAAERLLGGKSAWQIEYKERVRLKLLTRWIMRQRP GD TAVRRRLARKDLGKYCGLLDHLTALKEDRAKTADLIVQAARGVR AHKDAHGRQQDRELWLAKYAPCDLIVMEDLGRYRFATDRPPSEN RQLMQWTHREVFRVLVQMQAEVEGIQVLETGAEFSSKFDARTWAP GVRCEPITKLWVERYRNGEMPWLADKADEWRREGIELAQLVPGQLL PTGSGEQFVAVSATGGLRVRHADLNAAQCIALRALTGHGTAFRLTA RRLGDVVFSAKGLGKRPOGALWREFGSALPPAVVVLRPAGEVRYAL RPFASARDAAAALGLQLGALRNVDATDAESDAEDGDLAELLAGAD PDRATFFRDPGSDVHGGAWVQAKVFWAEVRRHVRLGLQAQGLLP AAARSSEPRQMQLPLAGALPGDDIPL

136	Cas12	MNRIYQGRVSKIEIKDSEGNFRNVPVGSPTCPLWRHHRIFQDAVN YYLVALGALAGTGSENAFVGLGSKDRVIHDLYSRLFDSWERFPRDM HGASSLRDSLRLTLPGLSERASLQDAFDAILSGNEANARERVLSSLI QDLGGDIQKGSRYFPFFCEPATKATFPRARVGLLKVEGKDFVPRLL WSSDLEIAPDQVVEQLKFEYFANPNESVQPIEGNEARVRLIEALDNP QLGIELPIEILSLRKRVLHETDIRIPRYFFGGAGAE LRKFRLDLFLIAA YVTPDPSILRALRNSFKEPSASKSSKKKDETEEVENLLRSLGDDPLILA RGERGFVFPSTSLPTWVGANAQKPIWRDFDIAAFEAELSLNQFT AKTEEREKLLKAEETLHYMLGISDAIPRSSDSETEEQAPSRPGKDP WPLVAQLEKELGENLSEGTWQLSR SAMRGLRDII GLWRKHGASV VTLQKDVKTYQADEKHKREIGSVQLFLLCEERYHALWQTETDDER GDESEENDDPARILSDAIEVHQIRREVERFREPIRLTPAEPVFSRRLF MFSDLTDKLAKVKFGETTEENSEVKSQFVEAAIALKEGENLKEARVRI TFSAPRLHRDELLGGAESRWLQPITAALGFSNPAPSVKFDSAVALM PDHMDGGRIRHLLNFPVNFDSA WLHQSIGKADLWKSQFNGTKDK NLHLHWAGTARDTTRKNTWWENRTIENGFTVLSNDLGQRSAGA WALLKVTCSPDTKHPVRSIGHDGTREWFATVLATGIHRLPGEDQR ILKNGKWATEQSGKKGRNATFSEYEAACVLAKNLGCESVENWLG SGEKSYPALNDQLVKIANRRITRLGTYHRWSCFSPEKFEDPARRANV IGGQLAELSAYQDENVTVSADILKSGDFEGFRHRAGAAFEALRTELE VHLVNLANLTAPLRQKVWSWQKRPDSSGYGDLLMVDLDDCHPKIR GQRGLSMARLEQLEGLRRLFLRYNRS LDRSPGIPAKFGREDVGR TSG EPCQALLVKIDRMKEQRVNQT AHLILAQALGVRLCPHRIEENERKSR DLHGEYEKIPGREPVDFIVIEDLSRYLSSQGRAPSENSRLMKWAHRA VRDKLKM LAE EPGIPVETVPAYSSRFHALNGQAGSRLHELHELEA YQQQLINLAAKTDFQNRDRSKAAGELFEQFQALAKLNERRRAEGK KVPRTL YYPKSGGPLFLASRDGTI HADVNAAINLGLRAIAAPACIDI HRRLRATKEKEVYRPRVGNAREKSAFSKDDIIQPSGAPSKKFASSSSP NFFYEPEDLKQANGEPLFDRAMFGEYSLVSGVSLWSMVNNAIYIRC VELNRTRLHGKDPDDQIPM
137	Cas12	MADDLSTQRAYTLRLQGTDPEDQSWRDALWMTHEAVNAGGRAFG GDWLLTLRGGAHELADTPVKGKKDITDEL RKKRRILLALS WLSVESR RGAPDKFIVAGGEEPAGSRNEKVLQALKEILKRRGLSAEESWMS DCRASLSAAIRDDAVWVNRSAAFDDAQVRIGASLTREDIWDMLDP FFGSREAYLTPAKKKKEDEDSSEGTGEEKAKDLVQKAGQWLSRFG TGKGANFDAMA EVYSKISEWAGTAQEGVSGKEGIKNLADALAAFS PVSQNLEGV LKISGPGYKSATRNLLGELDSL PVVSRDHLSALHEKAA EDTVKCKESTG TKGRRPYADAILNDVEKRCGFTYLTDSNRSVSILDT

		SEFPSDYKWGTARHSEFAVILDHAARRISVAHSWIKLAEERDRCEE DAAKVYDLPDKVKEWLDTFCSNRSDISGAQGEGYRIRKAIEGWKE VVASWGRSSCITAEDRVAAARALQDDPEIDKFGDIQLFEILAQDEAL CVWHKGDGDAKSPDAQMLIDYVLASDAESKKRRFKVPAYRHPDAL LHPIFCDFGNSRWDITYDIHGARGKKKAKRGSKKEEAMPRGVAMK LWTGSDVLSVSLRWQSKKLAADLALDQEAEEVTDTAAYSRADRLG RAAAGIDRGAGVTIAGLFEEAHWNGRLQAPRQQLAEIAAVRDNQK LSSEERERRIAFMKDRIRWLVTFSAKLRPQGPWHSYAPTQGLQSDP KYWPHSEINKKRKGQAKLILSRPLGLRILSVDLGHRFAAACAVWET MSSEAIQEACRLANHLQLPAPADLYLHLKRTVQKNLIDGEKTVEESTV YRRIGADRLPDGTAHPAPWARLDRQFLIKLQGEEKVREASNEEVW QVHLMESALGLSFPLIDRLVYAGWGGTEKQAARLEALREKGWKPT GTPADQDEEGGGYKPSLAVDELMFSAVRTLRALKYHGDRARIAFA LTADYKPMPGDTRYFSEAKDRSSGADAAEREAKHKDYLLDMLLL WHDLAFSRKWRDEEAKELWNLHIAALPGYQAPAAPIQEEAGQGRK KAREEARAKMTPAAEALLADGTLREKLHGLWKERWEKDDAQWKK HLRWMKDGILPRGGRAATPSIRYVGGLSLTRLATLTFERRKVQVGFY TRLFPSGEKREIKEAFGQTALDALERLREQRVKQLASRIAEALGAGR VSRTALKQDPKRPEARVDAACHAVIENLEHYRPEETRTRRENRLM NWASSKVKKYLSEACQLHGLFLREVPAGYTSRQDSRTGAPGMRCQ DVTVKTFNLSPFWQKQCVQAQKNKSTARDRFLCALKEAVAQGGM EEEKKMGPIRVVPVPGGEVFSADAASPAAGLQADLNAAAANIGLRA LLDPDWPGKWWYVPCDRKTAYPAKEKVEGSAADVVKALPFVLPE EKENKGKTKGGKKGKGEVMNLWRDVSAEPLMTGQWLDYTAYRK EVENRVIQVLTAQLKARNPLRFGNLGDEEEIPY
138	Cas12	MAIRSIKLLKLTHTGPEAQNLKGIWRTHRLLNEGVAYYMKMLLLF RQESTGERPKEELQEELICHIREQQQRNQADKNTQALPLDKALEALR QLYELLVPSSVGQSGDAQIISRKFLSPLVDPNSEGGKGTSKAGAKPT WQKKKEANDPTWEQDYEKWKKRREEDPTASVITLLEEGIRPIPLY TNTVTDIAWLPLQSNQFVRTWDRDMLQQAIERLLSWESWNKRQV EEYAKLKEKMAQLNEQLEGGQEWISLLEQYEENRERELRENMTAA NDKYRITKRQMKGWNELYELWSTFPASASHEQYKEALKRVQQRLR GRFGDAHFFQYLMEEKNRLIWKGNPQRIHYFVARNELTKRLEEAKQ SATMTLPNARKHPLWVRFDARGGNLQDYLLTAEADKPRSRRFVTF SQLIWPSESGWMEKKDVEVELALSQFYQQVKLLKNDKGKQKIEFK DKGSGSTFNHGLGGAKLQLERGDLEKEKNFEDGEIGSVYLNVIDF EPLQEVKNRQVQAPYGQVLQIRRPNEFPKVTYKSEQLVEWIKASP QHSAGVESLASGFRVMSIDLGLRAAAATSIFSVEESSDKNAADFSYW IEGTPLVAVHQRSYMLRLPGEQVEKQVMEKRDERFQLHQRVKFQI RVLAQIMRMANKQYGDRWDELDSLKQAVEQKKSPLDQTDRTFWE

		GIVCDLTKVLPRNEADWEQAVVQIHRKAEYVVGKAVQAWRKRFAD DERKGIAGLSMWNIEELEGLRKLISWSRTRNPQEVNRFERGHST HQRLLTHIQNVKEDRLKQLSHAIVMTALGYVYDERKQEWCAEYPAC QVILFENLSQYRSNLDSTKENSTLMKWAHRSIPKYVHMQAEPYGI QIGDVRAEYSSRFYAKTGTPGIRCKKVRGQDLQGRRFENLQKRLVN EQFLTEEQVKQLRPGDIVPDDSGELFMTLTDGSGSKEVVFLOADINA AHNLQKRFWQRYNELFKVSCRIVRDEEYLVPKTSVQAKLGKGLF VKKSDTAWKDVYVWDSQAKLKGKTTFTTESESEPEQLEDQEIIEAE EAKGTYRTLFRDPSGVFFPESVWYPQKDFWGEVKKLYGKLRERFL TKAR
139	Cas12	MPVRSINLKIVISRNTQGEKSQSIWTTAAVNDVRYEEQLLIMR GLGYHISDKDVSKESIQQERLSRIRRAQLENGLPEPLGTDALNSLV RKIFYEFIVPSSVKEDGNAQQANGFLSPLTDPISIGYLSIFEKLGTPDW VGQLKAGDPQAVENAKKWSATSAGIKRLSETGAPPKWKFLFTGD PSWPQSFSEDIDKKIKEIEGAPKVICQLMEMGVLPPLPAYFADKLEGS DGSLSRWDRLAFRLAVGHMLSWESWCIKSAEDHFERKRRVESFSEK HTTPSLIICFETLEKYQKERQEKELGQNRSLPMQRPFRITRRQIRGWE DLRDKWLKNTTRTYDSLKSIAKEQTKKGGRFGDPLFLWLAKPEN HAVWDADEDALSIFAKMNAMRGLLERSRETAYMTLPDPIEHPRSIQ WEAEGGSNFKNYVITHSPVEGLHVQLPLLCKSESGLIDQTFEFPLAP SDQFKVAQISKTKEVTITHQSVLDEEYRSKVGAADLLMDWPLYKN RRFESVEHGDIGPVFLKLSLIERILPDGWTPKRPQAISHFSSASGNS KHKLSVVSGRLVLSVDLGIRSFSGACSVFELSEHKPTSGMSFEIEGLNL WANHERSFMLNLPDEDVGNKGRQLQKTKDAELRAMRRVLGRYRK IYALAGIDPEDRKDILELLCQDQDIFEFERTIYKGLVTSTSVSQPLWEG KIKESLKALRNAFGRKVREWRANRLNSNLKYAGKTMWAIQHLED TRRFLHSWSHLGRFSGEIRRADRVKRGVFATRLLQHLDVSKRDRLKT GADLLVQSARGFLRDNQGNWKKSYAPCQVILFEDLSRYLMQTDPR RRENSQLMKWSHRSIPLEVAMQGELYGIHVCDTSAAFSSRYHARLA TPGIRCHALRKEDLSNQFLIESLQKENPDIDFGICKAGDLIPRGGGEIF VSCDGNNGGISRIHADINAAQNLQRRFWLRHGEAIRIPARKITLKGDEI WVPRSIGKRLQGAMSGCGYLIPTGHESGSCRWERITASKWESISRSS VAQKEEVNEDLLDIALLEEEALELSNEYTTFFRDPSGITLPSDLWFPM KTFWGMTRAKISAIKQ
140	Cas12	MTVKSIVKLRLDNMPEIRAGLWKLHTEVNAGVRYYTEWLSLLRQE NLYRRSPNGDGEQECYKTAEECKVELLERLRARQVENGHRDPAGSD DELLQLARQLYELLVPQAIGAKGDAQQJARKFLSPLADKDAVGGLGI

		AKAGNKPRWVRMRDAGEPGWEEKAKAEARKSTDRTADVLRLA DFGLKPLMRVYTDSDMSSVQWKPLRKQGAVRTWDRDMFQQAIE RMMSWESWNQRVGEAYAKLVEQKSRFEQKNFVGQEHVLQLVNQ LQQDMKEASHGLESKEQTAHYLTGRALRGSDKVFKEKWEKLPDAP FDLYDTEIKNVQRRNTRRFSGHDLFAKLAEPKYQALWREDASFLTRY AAYNSILRKLNHAKMFATFTLPDATAHPIWTRFDKLGGNLHQYTFLF NEFGEGRHAIRFQKLLTIEHGVAKVDDVTVPISMSAQLDDLLPGES NEPTLSFRDHGTDQHFTGEFGGAKIQYRRDQLDHVHRRRGARDV YLNL SVRVQSQSEARGERRPPYAAVFRVLVGDTHRAFAHFDKLSNYL AEHPDDGKLGSEGLLSGLRVMSVDLGLRTSASISFRVARDELKPNS EGRVPFFFPKIGNDNLVAVHERSQLLKLPGETESKDLRAIREERQRIL RQLRTQLAYLRLLVRCGSEDVGRRERSWAKLIEQSVDAANHMTDP WREAFEGELQKLKSLYGICGDREWTEAVYESVRRVWRHMGKQVR DWRKDVRSGERP KIRGYQKDVVGGNSIEQIEYLERQYKFLKSWSFF GKVSGQVIRAEKGSRFATTLREHIDHAKEDRLKKLADRIIMEALGYVY ALDAERGKGTWVAKYPPCQLILLEELSEYRFNDRPPSENNQLMQ WSHRGVFQELLNQAQVHDLVGTMYAAFSSRFDARTGAPGIRCRR VPARCAREQNPEFPWWLNKFVAEHKLDGCPLRADDLIPTGEFEFF VSPFSAEEGDFHQIHADLNAAQNLQRRLWSDFDISQIRLCDWGE VDGEPLIPRLTGKRTADSYGNKVFTNTGVTYERERGGKRRKAF QEELSEEEAELLVEADEAREKSVVLMRDPGSIINRGDWTRQKEFWS MVNQRIEGLVKQIRSRVCLPESACENTGDI
141	Cas12	MKNFQDFTNLYELSKTLRFELKPIGGTKKLIIEKNILKLDKKKRENYEK VKPYFNKIHQEFINFALRNPNDFSQFEKYLNWLKDKKNKDLLKEK ESIDKIFLEKIGKLFENSVDKFLKENGFEIVKEEDQNLKFFRRKEIFEVL QEKYGSELETQMVNKDGEIKSIFNGWEKWLG YFDKFFNTRDNFYKT DGTSTAIATRIIKDNLKIFLENIVAFGKIKNKKIDFSEVEKNFSVSIDTFF EINNFNCFQLQDGDIFYNKVIGGETLENGEKLGKGLNEIINKYRQDTGE KIPYFKKLQKQILSEKDGVIDKIEDDGGFYEV LKNFYKNAAEKEGFLK NIFENFYTISDNLEKIYFNKIAFNTISHKFGSALEFERILYEEMKKEKA DGIKFEKKENKYKFPDFIQIIFIKRSLNYSNENLFWKERYKSEENV GFLEKNNNNLWGOFCILNFEFLNILKRRRIIDEAGEEYEVGFESKNIL GEKLENFELNQENKGIKDFADYSLALYSFGKYFAVEKGRNWDNLNID SDDFYGGEDGYIEKFYNTGYDEIVKPYNLMRNYISKKPWEDNKKWK INFETSSLLSGWDKNLESNGSYIFQKGNKYLLGIINGSKPAKEILEKLYS GDGEKIKRFIYDFQKPDNKNTPRMFIRSKKDSFSPAVEKYNLPINDIL EIYDNGLFKTENKGNPNYKESLRKLIDYFKLGFSRHSFKHFNFWK DSKSYENIADFYRDVEKSCYKIDFEFLNFEELKLTFEKHL YLFQIYNKD FELDESLQEKGYNFKGEGQKNIHTKYFEALFLEENISRKSGAVFKLSG GGEVFFRKKSIKAKKEKRSVEVIKNKRYTECKYFLHFPIQVNFKEEIS

		GNFNQEINKFLANNPDINVIGIDRGEKHLAYFSVINQKGEILESGSFN KIENYNKNGEKLFPEREIKEIHKDGSIDLELVETGRKVDYVDYKLLLE YKERKRLLQRQSWKEVEQIKDLKKGYISALVRKIADLIKHNAIVIFEDL NFRFKQIRGGIEKSIYQQLKALIDKLNFLVNKNEINLEKAGSILKAYQ LTPVVDLSKEIGKQGTGVIFYTEAAYTSKIDPITGWRPNLYLKKNNSKIN KENILKFDNIVFNSKENRFEFTYDLKKFFGKDSKFPKTVNTVCSCVE RFKWNRLNNNNKGGYIHYENLTDGKLANKEQKEDEFSNFKELFEKY FIDINGNILEQIKNLDTKNNEKFFSSFIDLFTLVCQIRNTNQNAKGDE NDFILSPVEPFFDSRKSQNFGLPKNGDENGAFNIARKGLIILNRISE NPEKPDLLIFNADWDNFARNI
142	Cas12	MAQAEAPRRLRAYKFALDPTEAQLREFEQHAGSARWAYNHANAIL SRYSDTLRNRWNAWIAQHHGLSREQLYALPDRERTAIQAAAAAAV KAENAQLAAELRIIDHRKRVTHKGKPSVEPGEQPAEDAPERAYQL WRERVELARLHAEDPQAYRAERKRILDEIRPLVNATKRKLIEQGAYR PTAMDISTLWREIRDLPPDEGGSPWWPEVSIYFTSGFAHAETAW KNYLESLAGRRAGRPVGKPRFKKKRRSRRSFTLYGSVKLVYRRIQVP SIGSVRLHGSAKRLHRALERRGGIISITISQGGHRWYASVLVDELDT PGRETQRGPSRRQRDRGAVGVDLGVHHLVALSDPNEKTLDNPRHL RKARKRLLKAQRAMSRRRGPDKRTGQEPSRRWVKARNRVARLHH ELAVRRAGHLHEITKRLATSYELVAIEDLNVAGMTRSARGTIDQPGR GVRKAGLNRSILDTSPAEFRRQLQYKASWYGATVAVIDRWAPTSR TCSSCGAVKAKLSLAERTFFCEHCGMELDRDINAARNILAFASAYP GEGKALNACGGSVSPGSQSVVQAGADEAGRPARKPRRSSRGSDPP ATPTTRA
143	Cas12	MKRIAKFRHDKPVKREAWSKGYRVHKNRIINKVTRSIKYPLVVKDE WKKRLIDDAHDYRWLVGPINYSWCRDPNQYSILEFWIDFLCVG GVFQSSHSNICRLAIQLSGGSVFEQEWKDLSPFVRANLIQGIKPAEFI GFLTAEFRSSSNPKNFISKFFEGSNEDLESITNEFASIVDFIKAKDISLLR KSLPSCCKIAPNLWEKAVGSHSTNELLKLLTKYTRVMLVAEPSHSDR VFSQTVLQSNQDDPELTGPLPSHKVGKASYLFIPEFIREVNLDKISKL DLSAKSKLAVEQVKKLSELTSDFKQIENQSEAYFGLSTSFNELSNFLGI LIRTLRNAPEAILKDQIALCAPLDDKILKITLDWLCDRAQALPENPRFE TNWAEYRSYLGGKIKSWFSNYENFFEIPQAASSQQNNNREKKLGNR SAIRALNLKKEAFEKARETFKGDGKGTLEKIDLAYRLLGSISPEVLQCDE GLKLYQQFNDELLVLNETINQKFQDAKRDIKAKKEKESFEKLQRNLSS PLPRIPEFFGERAKKGYQKARVSPKLARHLECLNDWLARFAKVEES AFSEKEFQRILDWLRTSDFLPVFIRKSKDPPSWLRYIARVATGKYFFW

		VSEYSRKRQIIDKPIAQNPLKELISWFLNKFDAFSRDNELFKGLSSK MVTLARIMAGILRDRGEGLKELQAMTSKLDNIGLLHPSFSVPVTDLSL KDAAFYRAFFSELEGLLNIGRSRLIHERITLQSQSKNKKTRRPLMPEP FINEDKEVFLAFPKFETKNKVKGTRVVYNPDEVNWLLSPIRSSKGQL SFMFRCLSEDAKIMTTSGGCSYIVEFKKLEAQEEVLSIHDCDIIPRAF VSIPFTLERESEETKPDWKPNNRFGVDIGEYAVAYCVIEKGTDSIEIL DCGIVRNGAHRVLKEKVDRLKRRQRSMTFGAMDTSIAAARESLVG NYRNRLHAIALKHGAKLVYEVSAFESGGNRIKKVYETLKKSDCTGE TEADKNARKHIWGETNAVGDQIGAGWTSQCAKCGRSFGADLKA GNFGVAVPVPEKVEDSKGHYAYHEFPFEDGLKVRGFLKPNKIISDQK ELAKAVHAYMRPPLVALGKRKLPKNARYRRGNSSLFRCPFSDCGFT ADADIQAAYNIAVKQLYKPKKGYPKERKWQDFVILKPKEPSKLFDKQ FYRPN
144	Cas12	MAQAEAPRRRLRAYKFALDPTEAQLREFEQHAGSARWAYNHANAIL SRYSDTLNRNWNWIAQHHLGSLREQLYALPDRETAIQAAAAAAV KAENAQLAAELRIIDDHRKRVTHKGKPSVEPGEQPAEDAPERAYQL WRERVELARLHAEDPQAYRAERKRILDEIRPLVNATKRKLIEQGAYR PTAMDISTLWREIRDLPPDEGGSPWWPEVSIYFTSGFAHAETAW KNYLESLAGRRAGRPVGKPRFKKKRRSRRSFTLYGSVKLVYRRIQVP SIGSVRLHGSAKRLHRALERRGGIISITISQGGHRWYASVLVDELDT PGRETQRGSPRRQRDRGAVGVDLGVHHLVALSDPNEKTLDNPRHL RKARKRLLKAQRAMSRRRGPDKRTGQEPSRRWVKARNRVARLHH ELAVRRAGHLHEITKRLATSYELVAIEDLNAGMTRSARGTIDQPGR GVRKAGLNRSILDTSPAERFRLQYKASWYGATVAVIDRWAPTSR TCSSCGAVKAKLSLAERTFFCEHCGMELDRDINAARNILAFASAYP GEGKALNACGGSVSPGSQSVVQAGADEAGRPARKPRRSSRGSDPP ATPTTRA
145	Cas12	MAIRSIKLLKTHTGPEAQNLKGIWRTHRLNEGVAAYMKMLLLF RQUESTGERPKEELQEELICHIREQQQRNQADKNTQALPLDKALEALR QLYELLVPSSVGQSGDAQIISRKFLSPLVDPNSEGKGKTSKAGAKPT WQKKKEANDPTWEQDYEKWKKRREEDPTASVITTEEYGIPIFLY TNTVTDIAWLPLQSNQFVRTWDRDMLQQAIERLLSWESWNKRQVQ EEYAKLKEKMAQLNEQLEGGQEWISLLEQYEENRERELRENMTAA NDKYRITKRQMKGWNELYELWSTFPASASHEQYKEALKRVQQLR GRFGDAHFFQYLMEEKNRLIWKGNPQRIHYFVARNELTKRLEEAKQ SATMTLPNARKHPLWVRFDARGGNLQDYLYTAEADKPRSRFVTF SQLIWPSESGWMEKKDVEVELALSQFYQQVKLLKNDKGKQKIEFK

		DKGSGSTFNHGLGGAKLQLERGDLEKEKNFEDGEIGSVYLNVIDF EPLQEVKNRQVQAPYGGVQLQIRRPNEFPKVTTYKSEQLVEWIKASP QHSAGVESLASGFRVMSIDLGLRAAAATSIFSVEESSDKNAADFSYW IEGTPLVAVHQRSYMLRLPGEQVEKQVMEKRDERFQLHQRVKFQI RVLAQIMRMANKQYGDWRWDELDSLQAVEQKKSPLDQTDRTFWE GIVCDLTKVLPNEADWEQAVVQIHRKAEYVVGKAVQAWRKRFAA DERKGIAGLSMWNIEELEGLRKLISWSRTRNPQEVNRFERGHTS HQRLTHIQNVKEDRLKQLSHAIVMTALGYVYDERKQEWCAEYPAC QVILFENLSQYRSNLDIRSTENSTLMKWAHRSIPKYVHMQAEPYGI QIGDVRAEYSSRFYAKTGTPGIRCKKVRGQDLQGRRFENLQKRLVN EQFLTEEQVKQLRPGDIVPDDSGELFMTLTDGSGSKEVVFLQADINA AHNLQKRFWQRYNELFKVSCRIVRDEEYLVPKTKSVQAKLGKGLF VKKSDTAWKDVYVWDSQAKLKGKTTFTTESESPEQLEDQEIIEEAE EAKGTYRTLFRDPSGVFFPESVWYPQKDFWGEVKKLYGKLRERFL TKAR
146	Cas12	MVVRSIKLKMKTNSGTDISIYLRKALWRTHRLINEGIVYYMSLLTYR QDTLGDRTKEEIQSELIKKIREQQRNNGLSEELGSDQEILSLLRHYELI IPSINGESGDANQLGNKFLYPLVDPNSQSGKGTSNAGRSKWKRM KEEGNPDWEVEFKDEERKANDPTIKVFDHLKKYSLPLFPLFTNNQ KDIEWLPMGKRQSVRKWDKDMFIQAIERLLSWESWNRRLGAERE KLEEKIENFYKEHLSGGQIWIEKIREFERVRDRELGETSFSSNDGYLITS RQIRGWDRVYEKWSKISESASKEELWRVVAEQQSKMREGFGDPKV FSFLAELENMDIWRKHPERIYHIATYNGLLKKSHTKAQATFTLPDAV KHPLWIRYEAQGGTNLNLFKLEETTKKNCKVILSKIWPTEGDWFEK ENVEVDLAPSKQFYRQIKLQDHIKQKEISFSDYSSGISLKGVLGGSR QFDRKYIENHQELLPSGDIGPVFFNLVIDLLPIQETRNGRLKSPIGKTL KVSSEFPKVIDYKPKELTEWINVSSVTGKVGVESITEGMRVMSIDL GQRTSASVSIFEVVKELPKDKEKMLYYNIKDTELFALHKRSFLLNLPGE EVTKRNRQKRKDRRKLLFIRSQIRMLASVLKLETKNTPDERKKAINK LVEIVDSYEWTESEKEIWNSEFEYLTNKAVFKQEIWRESLIKSHHRM EPHVGQLVSEWRKSLNEGRRNLAGITMWNIEELEDTRLLISWSKR SRTPGEANRINNDPEFGAKLLEHIQNVKDDRLKQLANLIVMTALGYK YDKEEKSRDKRWKEKYPACQVILFENLNRYLFSLDRSKRENSKLMK WAHRSIPRTVWMQGEMFGLQVGDVRSEYSSRFHAKSGAPGIRCH SLNDEDLKEESFKLKHLETGFISEEEISSLKKGDIVPWPGGELFVTLK PYKKGKDIELTVIHADINAAQNLQKRFWQQNSEVYRIPCQLEKAGD DEFFIPKSQTEIVKKYFGKGRFVKINDKKEVYNWEESEKMKIKTESTIT LQDLEGFEDIFQTELAQEQKKYSTLFRDPSGYFFNEKNWRPQKEF WSIVNNIIRSSLKKKILKNKVEV

147	Cas12	MSNPNI PNISPNITLTRDDVVNLLMSSIAM EELGLAHII NAEGEKIQF ALGTLQGASGPPATLQQVLEVNQSTQAMLD TIFRQEMMLDSKLKT ATNIPTLRGPTGPVGPTGAPGGVISINGQTGVVTL DASNGVMPFM REQSTSSLD DYKDPGIYXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXGATGATGATGATGPQEPRALREPRAPQARREPRGLLEPQVL RGPQEPRALREPRAPRALREPRALRALRALQELRAPRALRGLQEPRV LQGPRERQVRPEPRVLQGP RERQVRQGLQGLLEPRAKRERQVRPE PREPQERQAPLVQQALLEPQALLGQAL
148	Cas12	MNRIYQGRVSKVEIPNPGDKGKPWQPLPNWQDILWQHHELFQD AVNYLLALLSLARDSANPATPIRKRMDDPASEHQIWTSFRRRGQM RSGMRDSVAKYLCPVKTEPTLDECFAAVLEGNKENPDVLDLALQELL DECDGDGAIQQEGRSMLPRFCSPSYKGDFPQSAAAKDKKSAKEWL PTFLHSAENASNLKLVQRQLKFELFANRDLTGRILD AVESRKRLTEML GWLTERNPSLAAERERLQKIIAALPDTFNLP AWRGGSVNKEALKQR FYAWLIFEHVESSRITFDILRDSFPTPKERKSVSETIQSEKPSLELSD PIKLARGTRGYVFRAFTSLPCWGADNANLLAWKEFDVAAFKEALKA LHQVESKSEERNKERERLLQRHSVMRGSIKWKPSPESEEKEPDVLG DPRIERLEKLLKTELASEYEMSEGQTVEYGLQPRTIRGFRDLRKEWN KIVKPGEPTFEQKKGNLVTALRSYQIENPNVIGSVRLYEALKEGNWL VWQEADSATVEKWAKQKFASDPLEALTEERQLLRDIERLKQPIRFTP ADAVHSRRQFYLAEKGDLSVKNRFD PQNQTLQVPIAKNDDHWKQ QFVKIHFSAPRAVRDQLIDETMEESKEARWQQPMMEALGLSLKLT KNNAEVSLSECTAVSLMPEELASGDRRILLNFPITLETAPMVKALGKA SLWDGQFAAYGDDNFYLRWPKDKWPAEKESNAWYRRLTEFSLLSV DLGQRDAGAFVIGATTGKPTRPASRFIGEANGQSWHASVRATGV LRLPGEDAHVFRSGQWQEELYGERGRSADATEWTEAKRICETLGLK FDEILGGDPQWFSFPELNDRLLFVRRRAQTRLARLQSWSWMIAD E TRRENIREAILAADDDELSLAAA EKS LWPVLA EKLA SEVNRLRNLI P QQLVLLANRILPLRGRRWEWIKRDDTS GCHVLRETNP GTDTTSKKV CGQRGLSMKRLEQLDELRRRFQSLNRALMQTPGQTAGLGKSKRGI ELPDPCPDLLDKTEQLREQRVNQTAHLILAQALGVRLRTPQKGDAL

		REQNNVHGEYETFRLPVDFIVLEDLSRYLSSQGRGRNENSRLMKWC HRAILLKLKQLCESYGLKILETNAAYSSRFCSRTGVAGFRAVELTPDAR KEFRWRKHLNRLEKAASGEIKLDREARAESEHVKRLFDMLDQLNAG RKEAGKPLRTLAPIAGGQIFIPMQGHATQADINAAINLGLRAIAAP DCHAIHVIRITERKDKTLRVRTGSNREKVRWEGKNPEIQMNKAADL ASLTGDRQPNFFPDPSAIACYDRAKIEGVQLPFASGRGLWGTMNIE LQWTRVNQLNNDRAEKKWNLTRSLPEQSSEEDYIPM
149	Cas12	MAVKSIKVKLMLGHLPEIREGLWHLHEAVNLGVRYTEWLALLRQG NLYRRGKDGAQECYMTAEQCRQELLVRLRDRQKRNGHTGDPGTD EELLGVARRLYELLVPQSVGKKGQAQMLASGFLSPLADPKSEGGKG TSKSGRKPAWMGMKEAGDSRWVEAKARYEANKAKDPTKQVIA SL EMYGLRPLFDVFTETYKTIRWMPLGKHQGVRAWDRDMFQQSLER LMSWESWNERVGAEFARLVDRDRFREKHFTGQEHLVALAQRLE QEMKEASPGFESKSSQAHRTKRALRGADGIIDDWLKLSEGEVPDRF DEILRKRAQNPFRFGSHDLFLKLAEPVFQPLWREDPSFLSRWASY NEVLNKLEDAKQFATFTLPSPCSNPVWARFENAEGTNIFYDFLFDH FGKGRHGVRFRQRMIVMRDGVPTVEGIVVPIAPSRQLDALAPNDA ASPIDVFVGDPAAPGAFAFGQFGGAKIQYRRSALVRKGRREEKAYLC GFRLPSQRRGTGPADDAGEVFLNLSLRVESQSEQAGRRNPPYAAVF HISDQTRRVIVRYGEIERYLAEHPDTGIPGSRGLTSGLRVMSVDLGLR TSAAISVFRVAHRDELTPDAHGRQPFFFIHGMDHLVALHERSHLIR LPGETESKKVRSIREQRLDRLNRLRSQMASLRLVVRTGVLDQKRDR NWERLQSSMERGGGERMPDWWDLFQAQVRYLAQHRDASGEAW GRMVQAAVRTLWRQLAKQVRDWRKEVRRNADKVKIRGIARDVP GGHSLAQLDYLERQYRFLRSWSAFSVQAGQVRAERDSRFAVALRE HIDNGKKDRLKKLADRILMEALGYVYVTDGRRAGQWQAVYPPCQL VLEELSEYRFSNDRPPSENSQLMVVWSHRGVLEELIHQAQVHDVLV GTIPAAFSSRFDARTGAPGIRCRRVPSIPLKDAPSIPIWLSHYLKQTER DAAALRPGELIPTGDGEFLVTPAGRGASGVRVHADINAAHNLQRR LWENFDLSDIRVRCRREGKDGTVVLIPRLTNQRVKERYSGVIFTSE DGVSTVGDATRARRSSASQGEGDDLSDEEQELLA EADDARERSVV LFRDPSGFVNGGRWTAQRAFWGMVHNRIETLLAERFSVSGAAEKV RG
150	Cas12	MGLVDTAGGFLIPAALDPAILSGDGSTNPIRQVXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

[illegible]

152	Cas12	MQEIKRINKIRRRRLVKDSNTKKAGKTGPMKTLVVRVMTPLRERLE NLRKKPENIPQPISNTSRANLNKLLTDYTEMKKAILHVVWEEFQKDP VGLMSRVAQPAPKNIDQRKLIPVKDGNERTSSGFACSQCCQPLYV YKLEQVNDKGKPHNTNYFGRCNVSEHERLILLSPHKPEANDELVTYSL GKFGQRALDFYSIHVTRESNHPVKPLEQIGGNSCASGPVGKALSDA CMGAVASFLTQYQDIILEHQKVIKKNEKRLANLKDIASANGLAFPKIT LPPQPHTKEGIEAYNNVVAQIVWVNLNLWQKLKIGRDEAKPLQRL KGFPSFPLVERQANEVDWWDMMVCNVKKLINEKKEDGKVFQWQNL GYKRQEALLPYLSSEEDRKKGKKFARYQFGDLLHLEKKHGEDWGK VYDEAWERIDKKVEGLSKHIKLEEEERSEDAQSKAALTDWLRAKASF VIEGLKEADKDEFRCCELKQKQWYGDLRGKPFIAEAENSILDISGFSK QYNCAFIWQKDGVKKLNLYLIINYFKGGKLRFKKIKPEAFANRFTV INKKSGEIVPMEVNFNFDDPNLILPLAFGKRQGREFIWNDLLSLETG SLKLANGRVIEKTLYNRRTRQDEPALFVALTFERREVLDDSSNIKPMNL IGIDRGENIPAVIALTDPEGCPLSRFKDSLGNPTHILRIGESYKEKQRTI QAAKEVEQRAGGYSRKYASKAKNLADDMVRNTARDLLYAVTQD AMLIFENLSRGFGRQGKRTFMAERQYTRMEDWLTAKLAYEGLPSK TYLSKTLAQYTSKCSNCGFTITSADYDRVLEKLKKTATGWMTTING KELKVEGQITYYNYKRQNVVKDLSVELDRLSEESVNNDISSWTKGR SGEALSLKKRFSHRPVQEKFVCLNCGFETHADEQAALNIARSWLFL RSQEYKKYQTNKTTGNTDKRAVETWQSFYRKKLKEVWKPAV
153	Cas12	MGKQSTNSSGLKATSGAPSIEKPVTTQRAYTLRLRGIEGDKTWDRSL WATHEAINLGAKAFGDWLLTLRGGLEHTLADATVAGGKGKPARPP SADERRDRRVLLALSFLTVEDERGAPKAPGLIVAYGDDCKSAKDSQ DGRDRKVEDALRDILIKRSVAPGAVESWVNDCCVSLKARIRDDAVW VNRSAAFDALRASWRGLTCPNARTVLEQFFGPVADWITLPARAAD DGEQDGTGGPTAAGSSNDTEFKLVARSFLSENFGTGLKSSKSDISDAL MQATRSLAALRGGSPGSAVWVSHLCTEFGLLAADDEARAKALRVIRG WTSGRRSKGRLALATAASKASLAQVDIELLIKLSSEAAQEKLAGSTKL PLPWWNDLMAALERSIGFGFVTERNLIDFGVMLDHAARRVSIACS WIKLAELERRQFEEDAKKLDQVRTQHADAAAFDLTLCRRGSESGS AGGASVIRKRAVLGWNEVVGDWARQGCKSVQERIDAARLLQGE LEKFGDIRLFEELAANDAQVWQNAEGETDPTILARYSAGSVAKAN QQRFKVPAYRHPDPLRHPVFGDFGKSRWKIDFAVHESDRAQSGGK RVRSLDAAWQSDVRNMRMALWTGKRVMVPLRWSSKRLSKDLG ISDLSLKDPTVVTRGDRLGRAAVGPGDPVRVASVFAEDNWNGLRQ APRVELNRVARLTQSGNLVQARRLRDRLSWLVSFSPKLAPSGPFIDY AAAHGIEPHKKSGEYWPNSAMNKKERKGGHHSKLIYSRLPSLRVLSVDL

		GHRFAAACAVWESMSAAQMRLAASKGKVVRGGIAEGALFIHIEST VADGTVRTTVYRRIGEDALPDGSPHPAPWAKLERQFLIKLQGEETPS RMAALDELVMIADWERALGYQPVASSTKQSNVAGLMGRTVRL FMHASRRHFDRAHNLTAEHRTKPGGVPESTEETRIELLIDTLAL WHGLFAGDRWRDPRAQKEWETSGLPSTLPGRGDDDETAFGGPG RKAAMVVYRNELKPHAERMAHSDLSNLSKCWTDRAWAQDDREW AKSGRLRLRRWITPRGLRPVSGDSAQLIERKAAAALRARHVGGLS MQRINTLTDLYRLLKSFKNRPEPSNLRKNIPEKGDARLIGFNQRLLDV RDRLREQRVKQLASRIVEAALGIGRIKIRRAAGSPRPTLRVDAACHA VVTENLSNYQPAELQTRRENRLMAWASSKVHKYLAESCQLHGLH LREVQPNYTSRQCSRTGAAGLRGVAVSATDLLTNPWWMRDVAQA KARIEKALKNGRNGAVADQLLSAEAWALRIPERDRHDKADESVK AFHAERVILPRKGGDLFVAESARCNGKGHPALQADLNAAANVGIR ALLDPDWPGKWWWVPCVGGTYSPSEKTSKAKVLEHIDQLPHEM VDPPQVAPKSSAPQPKSSRAAKVKAKEFRAIENRWRTCSSELLSQGK WIPSGEYWSKVEAAVCLVLNDQIT
154	Cas12	MAAFQRSYTMNLKPATSEQDKFILWNRLFLTHWSVNEGAKIFGELF LNLRGGLSPELDIFDLKVKDDKKKAFVMGRRRLALGWLVSVDN LSAGEHPFRIEIPVGRNMGKSQASTLLTEILKNKGKIDEAVIKIEWID DCTPSLIANIREDAVWINRASSFNSITPCPTKDEVWIVLSGLLGLRFLD LSLEEVKGKETELYDLGEKETQSKSDPSKKARELFGNLFTQNPVLMK NSRDKKDTFAKEFYLAKEFKDYELKEKIESWRKEKEFPLIENPVAEK YPPEVFTFTGSPCTVSKRYRKLVSLELWPSSQDENGNIPTKTEKEDKT HNQVLLDYLLKACNEGNGKTQKIITPVWANNLKAELKMNIEIRIG ESSSTELQRLMIKMAARRISQTLWIKINEQTKHDAYQKKNKAFKLL SEIDKNGEACKWLENYELFRTDDSGGEEYHISLRAISCWKQILEEWQ KNDSPKALREKVKEVQAEKKFGDARLFEDLADDNARSVWLLPDG NKTPDILNWWCEYRTAEIDESRFKIPCYCHPHFPHVYVEYKSNP KVIFAMKNNKVKGHIEHGWNPQNPRSIALSLFNNGNRESSLPFI WESKRLWKDLGGEATQIGDIPRSDRMGLSGKRESVKPKAPFQKEV WNARLQSDRRTLEKLEKYWNPESMKWIDDGKFLIQSKWFITFGPD METAEGPWKLYLKEKYVDNKILGNRSKENQKRGYRAKKLLSGYPAG MRILSVDLGHRYAASCAVWETITKKQITEELAYQPDNNSLFEHSCKTI DKKIKNTVYRRIGEDSIDAPWAKLEKQFTIKLQGEDKSCYLLRSDEKE LFRSILSKLSCLNNDTGHNILEMIENLLRIVKAKIYRQGILARISYSMTA QYKPGKGGQKSPLSDEDKIHYLSENLAAWSAIMGNQEWNEVDISD WYKTYISHLVSGPKPKEGNRKSDDRKIIIEYFLPAARKLYDDNETRIKI DLFKELWDENNKQLSAVLKEIKIILPKGIRYFDKNTDNPSKWNNQ SKLKQITHRGGLSMQRIVAIEEYKLAAYKNHPEPDDLTKNIPLPGD NSSAGFNQIRDTLERMKEQVRVKQIASRIVESALGLGIEGYKKRPLTP

		ENKPCQAIVIEDLSHYRPDELQTRRENRRMLQWSSSKVKKYLKEACE MHDVRLVEISPEYTSRQDSRTGAAGLRCDINIREFLKDSSRWQNKI NTIQKKPANKKSNLDQYLIELNESLGNKYKDKVIPSDNFVRIPRKGGD VFVSSSKESPVSQGIQADLNAAANIGLKALLDPDWAGAWWYILIEV KSNHVIPYGEKYKGSECLRAWKFSGLENQVMKNNMNLWRDLQSQ FSGEDKWMSYKEYNELTEKRVINILRERAGLELIKE
155	Cas12	MEDYSGFVNIYSIQKTLRFELKPVGKTLHEIEKKGFLKDKIRAEDYKA VKKIIDKYHRAIEEVFDSVLHQKKKKDKTRFSTQFIKEIFESELYYKT EKNIPDKERLEALSEKLRKMLVGAFKGEFSEEAKEYKNLFSKELIRNE IEKFCETDEERKQVSNFKSFTTYFTGFHSNRQNIYSDEKKSTAIGYRII HQNLPKFLDNLKIIESIQRRFKDFPWSDLKKNLKKIDKNIKLTEYFSID GFVNVNLNQKIDAYNTILGGKSEESGEKIQGLNEYINLYRQKNNIDR KNLPNVKILFKQILGDRETKSFIPEAFDDQSVLNSITEFAKYLKLDKKK KSIIAELKKFLSSFNRYELDGIYLANDNSLASISTFLFDDWSFIKKSVSFK YDESVGDPKKKIKSPLKYEKEKEKWLKQKYTISFLNDAIESYSKSQDE KRVKIRLEAYFAEFKSKDDAKKQFDLLERIEEAYAIVEPLLGAEYPRDR NLKADKKEVGKIKDFLDSIKSLQFFLKPLLSAEIFDEKDLGFYNQLEGY YEEIDSIGHLYNKVRNYLTGKIYSKEKFKLNFNSTLLKGWDENREVA NLCVIFREDQKYVLGVMKDKNNTILSDIPKVPNELFYEKMVYKLIPT PHMQLPRIIFSSDNLSIYNPSKSILKIREAKSFKEGKNFKLKDCHKFIDF YKESISKNEWDWSRDFDKFSKTSSYENISEFYREVERQGYNLDFKKVSKF YIDSLVEDGKLYLFQIYNKDFSIFSKGKPNLHTIYFRSLFSKENLKDVC KLNGEAEMFFRKKSINYDEKKKREGHHPELFELKYPIKDKRYSEDK FQFHLPISLNFKSKERLNFNLKVNEFLKRNKDINIIGIDRGERNLLYLV MINQKGEILKQTLDSMQSGKGRPEINYKEKLQEKEIERDKARKSW GTVENIKELKEGYLSIVIHQISKLMVENNAIVVLEDNLIGFKRGRQKVE RQVYQKFEKMLIDKLNFLVKENKPTEPGGVLKAYQLTDEFQSFEKL SKQTGFLFYVPSWNTSKIDPRTGFIDFLHPAYENIEKAKQWINKFDSI RFNSKMDWFEFTADTRKFSENMLGKNRVWVICTTNVERYFTSKT ANSSIQYNSIQITEKLKELFVDIPFSNGQDLKPEILRKNDVFFKSLLFYI KTTLSLRQNNNGKKGEEKDFILSPVVDKGRFFNSLEASDDEPKDAD ANGAYHIALKGLMNLVLNETKEENLSRPKWIKNKDWLEFVWER NR
156	Cas12	MKRIAKFRHDKPVKREAWSKGYRVHKNRIINKVTRSIKYPLVVKDE WKKRLIDDAAHDYRWLVGPINYSWDCRDPNQYSILEFWIDFLCVG GVFQSSHSNICRLAIQLSGGSVFEEQEWKDLSPFVRANLIQGKPAEFI GFLTAEFRSSSNPKNFISKFFEGSNEDLESITNEFASIVDFIKAKDISLLR

		KSLPSCCKIAPNLWEKAVGSHSTNELLKLLTKYTRVMLVAEPSHSDR VFSQTVLQSNDDQDDPELTGPLPSHKVGKASYLFIPEFIREVNLDKISKL DLSAKSKLAVEQVKKLSELTSDFKQIENQSEAYFGLSTSFNELSNFLGI LIRTLRNAPEAILKDQIALCAPLDDKILKITLDWLCDDRAQALPENPRFE TNWAEYRSYLGKKIKSWFSNYENFFEIPQAASSQQNNNREKKLGNR SAIRALNLKKEAFEKARETFKGDGKGTLEKIDLAYRLLGSIPEVLQCD GLKLYQQFNDELLVLNETINQKFQDAKRDIAKKEKESFEKLQRNLSS PLPRIPEFFGERAKKGYQKARVSPKLARHLECLNDWLARFAKVEES AFSEKEFQRILDWLRTSDFLPVFIRKSKDPPSWLRYIARVATGKYFVW VSEYSRKRVIIDKPIAQNPLKELISWFLNKDAFSRDNEFKGLSSK MVTLARIMAGILRDRGEGLKELQAMTSKLDNIGLLHPSFSVPVTD KDAAFYRAFFSELEGLLNIGRSRLIERITLQSQSKNKKTRRPLMPEP FINEDKEVFLAFPKFETKNKVKGTRVVYNPDEVNWLLSPIRSSKGQL SFMFRCLSEDAKIMTTSGGCSYIVEFKLLEAQEEVLSIHDCDIIPRAF VSIPFTLERESEETKPDWKPNNRFGVDIGEYAVAYCVIEKGTDSIEIL DCGIVRNGAHRVLKEKVDRLKRRQRSMTFGAMDTSIAAAARESLVG NYRNRLHAIALKHGAKLVYEVSAFESGGNRIKKVYETLKKSDCTGE TEADKNARKHIWGETNAVGDQIGAGWTSQCAKCGRSFGADLKA GNFGVAVPVPEKVEDSKGHYAYHEFPFEDGLKVRGFLKPNKIISDQK ELAKAVHAYMRPPLVALGKRKLPKNARYRRGNSSLFRCPSDCGFT ADADIQAAYNIAVKQLYKPKKGYPKERKWQDFVILKPKEPSKLFDKQ FYRPN
157	Cas12	MAIRSIKLLKTHTGPEAQNLKGIWRTHRLLNEGVAAYMKMLLLF RQESTGERPKEELQEELICHIREQQQRNQADKNTQALPLDKALEALR QLYELLVPSSVGQSGDAQIISRKFLSPLVDPNSEGGKGTSGAKAKPT WQKKKEANDPTWEQDYEKWKKRREEDPTASVITTEEYGIRPIFPLY TNTVTDIAWLPLQSNQFVRTWDRDMLQQAIERLLSWESWNRVQ EEYAKLKEKMAQLNEQLEGGQEWISLLEQYEEENRERELRENMTAA NDKYRITKRQMKGWNELYELWSTFPASASHEQYKEALKRVQQRLR GRFGDAHFFQYLMEEKNRLIWKGNPQRIHYFVARNELTKRLEEAKQ SATMTLPNARKHPLWVRFDARGGNLQDYLLTAEADKPRSRRFVTF SqliWPSESGWMEKKDVEVELALSrqfYQqVKLLKNDKGKQKIEFK DKGSGSTFNHGLGGAKLQLERGDLEKEEKNFEDGEIGSVYLNVIDF EPLQEVKNGRVQAPYQVLQIRRPNEFPKVTYKSEQLVEWIKASP QHSAGVESLASGFRVMSIDLGLRAAAATSIFSVEESSDKNAADFSYW IEGTPLVAVHQRSYMLRLPGEQVEKQVMEKRDERFQLHQRVKFQI RVLAQIMRMANKQYGDWRWDELDSLKQAVEQKKSPLDQTDRTFWE GIVCDLTkVlPRNEADWEQAVVQIHRKAEEYVGKAVQAWRKRAA DERKGIAGLSMWNIEELEGLRKLISWSRRTNPQEVNRFERGHTS HQRLLTHIQNVKEDRLKQLSHAIVMTALGYVYDERKQEWCAEYPAC

		QVILFENLSQYRSNLDIRSTKENSTLMKWAHRSIPKYVHMQAEPYGI QIGDVRAEYSSRFYAKTGTPGIRCKKVRGQDLQGRRFENLQKRLVN EQFLTEEQVKQLRPGDIVPDDSGELFMTLTDGSGSKEVVFLQADINA AHNLQKRFWQRYNELFKVSCRIVRDEEYLVPKTKSVQAKLGKGLF VKKSDTAWKDVVWDSQAKLKGKTTFTTESESPEQLEDFAQEIEEAE EAKGTYRTLFRDPSGVFFPESVWYPQKDFWGEVKRKLKGKLRERFL TKAR
158	Cas12	MTHAKKIPFPVLRSTLRKARQRIAAGSITAGERPFNSTVTRVVPVK DPVSDQVWAVAREAAMTLRGFGQGSLFDMLIHLHADGFRFLPSG REREAFFLKDLFDPTFDDGARRAFGDVMPGFTANSLREILGAPARK CGKVTSEILLPRLSKGLGVKKSAAPEVLSSLAALCEAFPTWSLLTA VDGGVGKVIDDLRTHGSRPLSLEKAWSTNLPEVPKGLGVPTLAFD DQAPAQSEQTPTGRFAGVVARYLAETFASNPEATAGDASKAVQAK VTPNGNALSWLFAVGRRAMCSTTLDELAIGNITSPRGRHALSSLK ERMALPALSVLGERAYPDSRATLQGTVDLIANYVNRLFELSSSAT SIAQTKLILPAAIQGDTAVFDGMPFSAEDVGALFEQLPSEIAKLEHAV KVLVGKERTSTLGYQKAVDDVDEFGVWASSVDAVIGQINARLKTLE RAQEPLGKLMGDGKLRVNIHEPEGPAVEIIPVLDQELQDVLTSR TAFADLEARYPMTVAKAQRHAEAEVRNALELASRKEGGLSLASADV PALAKRKILEPIISARRSSPAMATAVLTECLRQKLIVKGTGSESLRGY VLSGEQVIYAHPLSRRRSIVRLDREGLQNFDALEFLDALQKDATQRT NVRESLIVEMARQSLLSALPDRIEIGAIWQTPSQNHAPWANLR PVNGTVGRSETIKSFTAVFHSRISGLLYRLNRQKFMKEYDLRCFIGSTL LFSPKNADWAPPPQYRHGRFSALLARSDFPWEGAEGTHANAVRLA KFLIDETRATDLQQAIAAKALLAQLPHDWVVCDFDGAPEYEGAF VSAGEVSAWAKRSGYLLTPPRHFAGAFLEGFKSTKISPHGLTFERML ERDGDVIETGRRVTAAPFQEVAPAAQPWKPRHLAAGLDLGEAGL GVCLKNLDNGHEQTLLKTRKTRLLAHS AEHYRRKDQPRQVFRKQY NQSSENAIAAIGEVCLIDNLIARYDAVPVFESQAAAARGSNRMV ARVYAGVLQRYTYVVGNGAADATRTSHWLGANRWSYSFGADVIP KVRDLSPVLRSLIKPENVRDALGFPGLANAWRTSMICSVCGTDP IGALEEIAANQISFVTDNEGEGSLDLGDGRKVTLRVEVPTSSALTKR EASRRRRRAPWEAKVGTWTLTRKSHRDDLLTTIRSLRRPSSTFQG STTKQWEFHCPCCGQIQQADVNAASNLVRRYFVRASDNARARQH WADDSKRLAFIASMGPDRSAREEKVS
159	Cas12	MNRIYQGRVTKVEKLKNGKSPDDREELKDWQTALWRHHLEFQDA VSYYTLALAAMAEGLPDKHPINVLRKRMEEAWEEFPRKTVTPAKNL

		RDSVRPWLGLSESASFGDALKKILPPAPENKEVRALAVALLAEKARTL KPQKTSASYWGRFCDDLKKKPNWDYSEELARKTSGSDWVAGLW SEDALNKIDELAKSLKSSLVKCPDGGQINPEGARNLVKEALDHLEGV SNGTKKEKNDPGPAKKTNNWLRQHASDVRNFIHKNNQFSSLPNG RLITERARGGGININKTYAGVLFKAFPCPFTFDYVRAAVPEPKVKKVD QEKKSEQSATWTELEKRILRIGDDPIELARKNNKPIFKAFTALEKWS QNSKSCWSDFDKCAFEELKTLNQFNQKTEEREKRRSEAEELKYM MDENPEWKPKKETEGDDVREVPILKGDPRYEKLVKLFGLDDEEGSE HATGKIYGPSRASLRGFGKLRNEWVDLFTKANDNPREQDLQKAVT GFQREHKLDMGYTAFFLKLCDYWDIWRDDTEVEVKKIREKRWV KSVVYAAADTRELAEEELRLQEPVRYTPAEPQFSRRLFMFSDIKQKQ GAKHIREGLVEVSLAVKDQSGKYGTCRVRHLHYSAPRLIRDHLSDGSS SMWLQPMMAALGLSSDARGCFTRDSKGNVKEPAVALMSDFVGR KRELRMLNFPVDLDISKLEENIGKKARWEKQMNTAYEKNKLKQRF HLIWPQMELKETQEPGQFWWDNPTIQKEGMYCLAIDLSQRRAD YALLHAGVNRDSTFVELGQAGGQSWFTKLCAAGSLRPLGEDTEVI REGKRQIELSGKKGRNATQSEYDQAIALAKQLHNENSAEESAARD WLGDNARKFSFPEQNDKLIDLYGALSRYKTWLRWSWRLTEQHKE LWDKTLDEIRKVPYFASWGELAGNGTNEATVQQLQKLIADAVIDL RNFLEKALLHIAYRALPLRENTWRWIENGKDGKGPLHLLVSDGQS PAEIPWLRGQRGLSIARIEQLENFRAVLSLNRLLRHEIGTKPEFGSST CGESLPDPCPDLDKIVRLKEERVNQTAHLIAQSLGVRLKGHSFTTE REKADMHGEHEVIPGRSPVDFVLEDLSRYTTDKSRSENSRLMK WCHRKINEKVLLAEPFGIPVIEVFASYSSKFDARTGAPGFRAVEVTS EDRPFWRKTIEKQSVAREVFDCLDNLVGKGLNGIHLVLPQNGGPLFI AAVKEDQPLPAIRQADINA AVNIGLRAIAGPSCYHAHPKVRLIKGES GTDKGKWLPRKGKEANKRENAQFGNVDLDLEVKNRLDIDSDVLK GDNTNLFHDPLNIACYGFATIQNLQHPFLAHASAVFSRQKGAVARL QWEVCRAINSRRLEAWQKKA EKA AVKR
160	Cas12	MSHELAEQSPPKNKEPTCEESDAIRKNRRILLALSWLSVEDDCSAP TGTFRVASGKDSEAERKNKVLTAFRSILTARRMRSQDVESWIADCA ASLSAKIREDAVWINRSACFDQRALDLKVLRSREYAKAAVMSFFGPLD EYFKLPDEADDTKPAVGGDGPDFRTLARQWVSTNFGTGKSDSEAI AQNLRLKLDANLAPFSGKPKAALIAHLSVELDGSTADIDGLCRAIGW NTGRPSKGRVAIERLPDPPTETSIQTMQQKFREEAEAKASSKGLRQV PEWMPAFQKSIERDCGMPFKLGEGRDHIGEFVMLDHAARRVSIG HSWIKRAEAERRRFEADAQRLNHIPAAAKDWLDQFVQFRSGSSGA AAAGGEYRIRRAIEGWDEIIKRWKRAACKSPEDRVAAAREVQADP EIEKFGDIQLFEALAADDAECVWRGDGNGTDPPLKDYVAATDALDK MRRFKVPAYRHPDPLAHPVFGDFGNSRGDIRFAVHEAAKATRGTK

		RIAKDQKEWIRERHGLRMGLWDGQSVRTADLRWSSKRLVDDLALR NHVTTRRTGPVSRADRLGRAAAGLGADAAACVAGLFELPDWNGRL QAPRAQLDAIAACVAANGGKWDDKARKLRDRIEVLVSFSAKLECC GPFMEYASQNGIQPNGKGEYYPHAERNKGRTGHAKLILSRPLGLRV LAVDLGHRFAAACAVWEALSKIAFDAETKGREVVSGGRAADDLYC HTRHLDCAKARTTIYRRIGPDKLPDGSHPAPWARLDROFLIKLQ GEERPARAAGPAETAADVQQIETDLGRARGQEDLPPRPVDSLMREA VRTIRIALRRHGDAARIAYAFKPGAKRLKPGGGAQDHTPETHADAIL EALLRWHELATGARWRDPWAETQWKDWVQPHISATLPELANDA DRWERKRHRAALEQVLRPVAQMLIQRPDHALHQVWSKHWADED LKWPSRLRWLRNWLLPRGPRARSGAARNVGGSLRLRIATLRELYQT QKAYAMRPEPDDPRKRIAGRND DRYDELGRSVLQVIERLREQRVK QLASRIVEAALGVGRAKPTRGRQRQPQSRVDVPCHAVIIESLRNYRPD ELQTRRENRAIMNWSAGKVRKYLEEACQLHGLHLREVMPNYTSRE DSRTGLPGVRCVDVPVDPKLGPKAYWWNSVLSTARKKSIGDAAS HDKQGDATSRFIVELAGCLDRLKADGKPLPKTVRVPRIGGDLFVAAP PTSCTAPAHQHPACD GARALQADLNAAAANIGLRALLDPDFPAKW WYVPCIDDQRLALPRADKVLGSACFPDGPATFGSLLKTRTAAGPA VDGQAAPDRKPRTGTHRPGSAKSRSLGDGKATTNYWSDRSARDLR PADEGGHWQPTNVYWNWVRKRALLGLYSFNGLSPPSDDRP
161	Cas12	MAIRSIKLLKTNTGPEAQNLKGIWRTHRLNEGVAAYMNMMLLLF RQESTDKKTKQEIHEELIRHRAQQQRNHADEKTQALPLEKALEALR KLYELLVPSSVGQSGDSQIISRKFLSPLVDPNSEGKGTSKAGAKPA WQKKKEANDPTWKQDYEKWKKRREEDPTASVITTEEYGIPLPL YTNTVAEIAWLPLKSGQFVRTWDRDMFQQAIEGMLSWEWNRR VQEEYAKLEGKMAQLNEQLEGGEWIRLLEQYEEKREQELRENMT AANDKFRITKRQMKGWKELYEVWSTFLPSASQEYKEAIKRVQQR LRKFGDFHFFQYLSEENRLIWKGNPQRIHYFVARNELTKKLEKAK QSARRTPDANKHPLWVRYDARGGNLQDYLLTAESDKPRSRRFVTF SqliWPSESGWLEKKDVQAEALSRQFYQQVTFKNDKGKQIEFEK DKGSGTTFSGHLGGAKLQLERSVLENKERKFEEGEIGKAYLNVAIDFK PLQEVKNRQVQAPYGQVLQIRLPNAFPKVRTYKSEELVEWIKASPO HLSGVESLASGFRVMSIDLGLRAAAATSIFSVEESSDKNATKLAYWIE GTPLVAVHQRSYMLRLPGEQVEQHVVWEKRDERGDQHKRVRFQIR RLAEIIRLANKQYGDRWDELNRLDEAVSKEKSPLDQADRTFWEGIVS DLTALPLNDADWTEAVVQIHRKAELYVGKVQAWRKRFNADERK GIAGLSMWSIEELDGLRKLISWSRRTNRPQEVNRFEPHTGHKRL THIQNVKKDRLKQVSHAIVMTALGYIYDEKKQKWKACYPACQVILF ENLSQYRSNLDRAKENSTLMKWAHRSIPKYVHMQAEPYGIQIGD VRAEYSSRYAKTGTGPGIRCKKLEHVDVKGWRLDHLKKRLVNEQFLT

		EAQVEQLKAGDIIPDDSGELFMTMTDGSGGKEIVFLQADINAAQNL QKRFWQRNSELFKVSCRIVVRDEAEYLPQAKKVQEKLKGKGVFVKK SDTAWKEVYVWDSQAKLKGKTTFTTESESPEQLEDLQEMIEEAEAA KGTYRTLFRDPSGVFFPDPVWNTPKDFWGEVVRKLYGKLRERLLTK VR
162	Cas12	MNRIYQGRVTKVEVPDGGKDEKGNIKWKKLENWSDILWQHMLF QDAVNYTALAAISGSAGVSGDEKSIILREWAVQVQNIWEKAKKKA TVFEGPQKRLTSILGLEQNASFDIAAKHILRTSEAKPEQRASALIRLEE IDKKNHNVVCGERLPFFCPRNIQSKRSPTSKAVSSVQEQKRQEEVRR FHNMQPEEVVKNVAVTLDISLFKSSPKIVFLEDPKKARAELLKQFDNA CKKHKLGVGIKKAFTESIDKHGSSLVKVPAGSGPSGLYPSAIVFKYFPV DITKTVFLKATEKLAMGKDREVTNDPIADARVNDKPHFDYFTNIALI REKEKNRAAWFEFDLAAIEAIMSPHRFYQDTQKRKEAARKLEEKIK AIEGKGGQFKESDSEDDDDVDSLPGFEGDTRIDLLRKLVTDTLGLWGE SETPDNNNEGKTEYSISERTLRIFPDIQKQWSELAEKGETTEGKLLVL KHEQTEHQSDFGSATLYQHLAKPEFHPIWLKSGTEEWHAENPLKA WLNKELQYELTDKKRPIHFTPAHPVYSPRYFDFPKKSETEEKEVSKN THSLTSLASEHIKNSLQFTAGLIRKTNVGGKAIKARFSYSAPLRRDC LRSENNENLYKAPWLQPMMRALGIDEKADRQNFANTRITLMAK GLDDIQLGFPVEANSQELQKEVSNGISWKGQFNWGGIASLSALRW PHEKKPKNPPEQPWWGIDSFSLAVDLGQRYAGAFARLDVSTIEKK GKSFIGEACDKKWKYAKVSRMGLLRPGEDVKVWRDASKIDKENG FAFRKELFGEKGRSATPLEAEETAELIKLFGANEKDVMPDNWSKELS FPEQNDKLLIVARRAQAAVSRHLRWAWFFDEAKRSDDAIREILES DTDLDKQKVNKNEIEKVETIISLLKVKQELLPTLLTRLANRVLPLRGRS WEWKKHHQKNDGFILDQTKAMPNVLRGQRLSMDRIEQITELR KRFQALNQLRRQIGKKAPAKRDDSIPDCCPDLEKLDHMKEQRVN QTAHMILAEALGLKLAEPKDKKELNETCDMHGAYAKVDNPVSFIVI EDLSRYRSSQGRSPRENSRLMKWCHRAVRDKLKEMCEVFFPLCERR KAGSAWVSLPPLLETPAAYSSRFCSRSGVAGFRAVEVIPGFELKYPW SWLKDKKDKAGNLAKEALNIRTVSEQLKAFNQDKPEKPRTLLVPIAG GPIFVPISEVGLSSFGKLPQVVQADINAAINLGLRAISDPRIWEIHPR LTEKRDGRLFAREKRKYGEEKVEVQPSKNEAKKVKDDRKNPYFAD FSGKVDWGFNGIKNESGLTLVSGKALWWTINQLQWERCDFDINKRH IEDWSNKQKQ
163	Cas12	MGEENNFSQFTGLYELSKTLRFELKPVWETEKLLIENQVFPKDKIVYE SYKKIRPYLDKLHLQFIEESLSSVKLDFNEIEKKFLEWDKEKDKTTKNKL

		KEEIFWKNKKWWLNSNLRKDMVSYFNLNWKKWINNFENKTIVNE KWKEEKIKIKWEWYKILLSDSNLILSDFFTQEKEWDNVLEKYIENP NFKENDWEKKFILEKQNLFSFKWFTTYFTNFNHSRENFYKDDWKS WRIATRIIDENLIFFLKNKKAFDEKYKNNSEITVKFNEKLLNFWEKLED FFSLDFYNRCYTWKQIEYYNQLIWELNSVNVHEKQAKFSEYTQNNK VSENNKFNKYDFPIFKELYQILSEKATEQKFIEINDFKELKQNLQELIE KKNQKNKFAINLTKSLIEKIDEYDFEKIYISKLSLNTISSKFFWSNKKWFFI QENLEKNIWKKNNWIDLPDFIKLSDIKTALFNFNKILFEDKENKEN IFKEEFDNITENNIFIKFMKIYENEFINLIEWKKNNKWDEIHWYNKSL LDLEKNILNISDFSDKKEEKEKQIEYIKKYLDSSLNIYRVMKYFALEKGG ESVEWETFDDIFYNEFKFYIDNEIISYNEFRNYLTKKPYSSNKLKLN FENWTLIDGWDKNKEPDNYWTILRKNWKYFLALQIKWKNNIFYKK KWSWVIDIEEAYKIDLWDEFYEKMDYKFLPDPKMLPKVIFAKSNV KLFNPSKEILQIKENETFKTWDFKVNDFYKIVDFYKENIIPYDWWKIF NFKFSDTKTYNNLSDFYKEIELWSYDLNFRKVSCKYILKSIEEKNIYLFIE YNKDFADWKTWSENLTMYFKWLFEEENLNINVLKLNWQAEIFR REASLKEKEVNRKENKEKSHNIIENARYTKDKLFFHCPIKLNFAKHN EKNQELKYISDNKEINIIWIDRWEKHLAYYSVINRDWNIIDKNWN LVKWSLNIWNNQNYHDKLETREKERQDARWSWKTIWNIKDLKQ GYISQVVKLAELVIEHNAIIVFEDLNSWFKRWRQKIERQVYQKLEK ALIEKLNLYTFKDKNFWENWHYLKAYQLTAPFETFEKVWKQTWVIF YTDPSYTSSTCPACWFRKDLYLKYSNLKNALWDIEKIDSIFDWKRFIF EYNNKKVFTDRDRKRNISSSESWIKWWKTIDNNITEFLEILFKKSNID YTSWNNLILDIQEINEKELYKWWFDNFNAILNIRNSTIKDNSRTWDFI CCPACDFDSRKENKIWIENWDDNWAFNIARKWIIILNKIDSYLNK WSLDKILWDMIVKQIDWDDFTHKK
164	Cas12	MAQASSTPAVSPRPRRYREERTLVRKLLPRPGQSKQEFRENVKKLR KAFLQFNADVSGVCQWAIQFRPRYGKPAEPTETFWKFFLEPETS PNDSRSPEFRRLQAFEEAAAGINGAAALDDPAFTNELRDSILAVASRP KTKEAQRLFSRLKDYQPAHRMILAKVAAEWIESRYRRAHQNWERN YEEWKKEKQEWENHPELTPEIREAFNQIFQQLEVKEKRVRICPAA RLLQNKDNCQYAGKNKHSVLCNQFNEFKKNHLQGKAIFFYKDAEK YLRGGLQSLKPNVQGPFRDWNKYLRMYMNLKEETLRGKNGGRLPH CKNLGQCEFNPHALTCKQYQQQLSSRPDLVQHDELYRKWRREYW REPRKPVFRYPSVKRHSIAKIFGENYFQADFKNSSVGLRLDSMPAGQ YLEFAFAPWPRNYRPQGETEISSVHLHFVGTTRPRIGFRFRVPHKRS RFDCTQEELDELRSRTFPRKAQDQKFLEAARKRLLETFGNAEQELR LLAVDLGTDSARAAFFIGKTFQQAFLKIVKIEKLYEQWPNQKQAGD RRDASSKQPRPGLSRDHVGRHLQKMRAQASEIAQKRQELTGTPAP ETTTDQAACKATLQPFDLRGLTVHTARMIRDWARLNARQIIQLAEE

		NQVDLIVLES LRGRPPGYENLDQEKKRRVAFFAHGRIRRKVTEKAV ERGMRVVTVPYLASSKVCAECRKKQKDNKQWEKNKKRGLFKCEGC GSQAQVDENAARVLGRVFWGEIELPTAIP
165	Cas12	MGEENNFSQFTGLYELSKTLRFELKPVWETEKLLIENQVFPKDKIVYE SYKKIRPYLDKHLQFIEESLSSVKLDFNEIEKKFLEWDKEKDKTTKNKL KEEIFWKNKKWWLNSNLRKDMVSYFNLNWKKWINNFENKTIVNE KWKEEKIKIKWEWYKILLSDSNLNLSDFFTQEKEDNVLIEKYIENP NFKENDWEKKFILEKQNLFSFKWFTTYFTNFNHSRENFKDDWKS WRIATRIIDENLIFLKNKKAFFDEKYKNNSEITVKFNEKLLNFWEKLED FFSLDFYNRCYTWWQIEYYNQLIWELNSVNVNHEKQAKFSEYTQNNK VSENNKFNKYDFPIFKELYQILSEKATEQKFIEINDFKELQNLQELIE KNKQKNKFAINLTKSLIEKIDYDFEKIYISKLSLNTISSKFFWSNKKWFFI QENLEKNIWKKNNKWKIDLPDFIKLSDIKTALFNFKILFEDKENKEN IFKEEFDNITENNIFIKFMKIYENEFINLIEWKKNNKWDYEIHWYNKSL LDLEKNILNISDFSDKKEEKEKQIEYIKKYLDSSLNIYRVMKYFALEKGG ESVWEFETDDIFYNEFKFYIDNEIISYNEFRNYLTKKPYSSNKLKLN FENWTLIDGWDKNKEPDNYWTILRKNWKYFLALQIKWKNNIFYKK KWSWVIDIEEAYKIDLWDEFYEKMDYKFLDPKKMLPKVIFAKSNV KLFNPSKEILQIKENETFKTWDKFKVNDFYKIVDFYKENIHKYPDWKIF NFKFSDTKTYNNLSDFYKEIELWSYDLNFRKVSCKYILKSIEEKNIYLF YNKDFADWKTWSENLTMYFKWLFENNLLNIVLKLNWQAEIFR REASLKEKEVNRKENKEKSHNIIENARYTKDKLFFHCPIKLNFAKHN EKINQEILKYISDNKEINIIWIDRWEKHLAYYSVINRDWNIIDKNWN LVKWSLNIWVNNQNYHDKLETREKERQDARWSWKTIWNIDKLDKQ GYISQVVKLAELVIEHNAIIVFEDLNSWFKRWRQKIERQVYQKLEK ALIEKLNLYTFKDKNFWENWHYLKAYQLTAPFETFEKVWKQTWVIF YTDPSYTSSTCPACWFRKDLYLKYSNLKNALWDIEKIDSIFDWRKRFIF EYNNKKVFTDRDRKRNNISSESWIKWWKTIDNNITEFLEILFKKSNID YTSWNNLILDIQEINEKELYKWVFDNFNAILNIRNSTIKDNSRTWDFI CCPACDFDSRKENKIWIENWDDNWAFNIARKWIIILNKIDSYLNK WSLDKILWWDIMIVKQIDWDDFTHKK
166	Cas12	MATAINYPTTQRAYTLRLRGIDPQDQSWRDALWATHEAVNRGAK VFGEWLLTLRGGLDHQLADAPVKVRGGTTRLPSDEERRDRRVLLAL SWLSVEDAHGAPPDASLIVAKGTDSADCRARKLADALIAILQARSVA ASEIGDPSKPPEDQPGTWLGDCMGSLSAAIRDDAVVWNRSAFDA ATQSCPSLTRDEIWDFFLEPFFASPDAYLKPERAESDEGDSTAATEDK AKDLVQKAGGWLKRMGAGGGANFQDLARAYQAIQWASSAQP

		GQSAQQAVGSLAGYLSQHGFSPANDATGVLAVISGPGYKSATRN HITAIATSPFITPQDLSKLQELATKDKAGCSSKIGGKGRPYATMILQ QVEAACGFTYLQSDGPARHREFSVMLDHAARRVNVVAHSWIKNAE AERRQFESDARRIKKVPQDALNWLRGYCEERGGASGSLEGYRIRRR AIDGWDQVVIRWSRSDCQSADDRIAAARQLQDDPEIDKFGDIQLFE ALAAEEALCVWKPDPGNPTAQPLKDFVAATEADAKKKRKFVPAYRH PDPLRHPVFTDFGNSRWGIEYSAHRAPAKCDELGQQVDRLTQAVA EAQRNLGDGATAAQRASRESKLAEAQSKLVAAQTEFAAINDPHRVEL KLWNGQAVAAIPMRWSSKRLIADLSLRRATQPSSDQRIGVTRADRL GRAAGNADDGRPVITITGLFQQDHWNGRLQAPRAQLDAIAKHVDK HGWDAAKARRQIARIRWVVSFAELSQQGPWFEFCHRFEGEDAPAR PFVSRHGEYAVKHRDNDQRKGHAKLILSRPLRLVLAVDLGHRYAA ACAVWEAISSDQMRQACAAANAPAPHPLAMYIHLKSTTAKGKPTT TIYRRIGPDKLPDGTTPHAPWARLDQRFLIKLPGEDRPARAASPDEIK AVEDFEDSVGRVRTAVDPPRKRGVDLLMHDVARTARLALRHGRR ARIAFQLISQVRILPGGRPQTLDAGRRDLLNDTLADWYALATDSR WTDAAARQLWNERLAALNGGFTIDPPADASQPEAERTRAQRQA EQELRHRLASLVEALFCNPTLCQQHLQAWTDRWNADDQQWRSRL KWLSRWLLPRGGSRRDGSRRHVGGSLTRISTLIDFRRKVQVGYFTR LRPDGSRAEIGPQFGQSTLDAIQLKQRIKQLTSRIVEAALGIGVEQ DRIWDAAKRWRTVKRPREPRYHVDDQGVQQRDPFQACHAVVI EDLSHYRPEETRTRRENATMDWKSATRKRLADHCQLYGLHLRD VNPQYTSRQDSRTGAPGCRCVDVSVADFLTKPAWRKQVAQARGK VASNRGDARDRLVELDHQLTTANSLRGEMDSLIPVNGGEVFSVA DPRSPLAAGIQADLNAAANIGLRALMDPDFLGTWWVYPCDPSTKK PHIEKVKGSLATVGALQATSEEAAPPRRGRGGTRSAAPREVINLW RDPSAVRIQDATAGEVWDVTPVYWSIVKDRVVDVLRQRNTKSGD
167	Cas12	MAVRSVKLLVPRDGSAESVRKRKALWATHQFVNDAAYAAELL EMRQEDVCRGTDDHGKDVIEPAAHWQAKLRARLAQKLPVAVA EALPLLKAFYGSRLIKSFVANDKGVAGTGNATDLNTWLSGLVDPASV AGEKTELKQLLAELPLCEAADADFEAARKMLAKSDAREALLEGP GTGVGWPAAYNANPTDSVWLDMLHKAARKARLEADTTVSELKK LGVFPLLQAASSNRVFGSGVLNPFERMAAAQAAAALLPWETKRHE MRKRDKFADQLNQWDETFGASHATALAAIRAFEAEESERARRESL GNEGTYRIGGRELDAWTLLRDWLKGHSTATAAAREDKVRELQA KQGRSFGSHRLLSWLAKPAQQWLADHSAGDVVTRIAVRNARQRK LDTARTLPIWTGADAVKHPRFANFDPPNNTNQPGFDLRAGTQKGR LTLRLSLLTERADGLLAQDHDQFLVPSRQMAEIVLHKDGKERALS WSQSDGIGRQVGDVGGALLFSRDHAECLLERKQITRLERGAWPAAL PVWFKLSLDIGAHEKALLKQRFKWGVWLNLSALVTRNAKDAKGVPP

		PVGTRVLAVDLGLRSAATVSVWQVDAATPVVAGKWRVPLSDTLS AVHERSAMLALPGEHVDAGVLAARRAANEKLAGLLAATSHLSTVFK LGRAEQGDRRRELLERLGEGDDRRARAATAAERDGLRAVLGA TQDAWAGAVAAVWRRLETLAGAIAAYRKQQREDVQLRREARHG PGASQLPKQAAAERLLGGKSAWQIEYKERVRLKLLTRWIMRQRP TAVRRLARKDLGKYCGLLDHLTALKEDRAKTTADLIVQAARGVR AHKDAHGRQQDRELWLAKYAPCDLIVMEDLGRYRFATDRPPSEN QLMQWTHREVFRVLVQMMAEVEGIQVLETGAEFSSKFDARTWAPG VRCEPITKLWVERYRNGEMPWLADKADEWRREGIELAQLVPGQLL PTGSGEQFVAVSATGGLRVRHADLNAAQCIARLTGHGTAFRLTA RRLGDFVSAKGLGKRPGALWREFGSALPPAVVVLRLPAGEVRYAL RPFASARDAAAALGLQLGALRNVDATDAESDAEDGDLAELLAGAD PDRATFFRDPGSDVHGGAWVQAKVFWAEVRRHVRLGLQAQGLLP AAARSSEPRQMQLPLAGALPGDDIPL
168	Cas12	MAAFQRSYTMNLKPATSEQDKFILWNRLFLTHWSVNEGAKIFGELF LNLRGGLSPELGIFDLNKDKDDRKKKALVMGRRRLLALGWLSVEDN LSAGDHPFRIEIPVGRNMEIKQATTLTEILKNKGVKDEAVIKEWID DCTPSLIANIREDAVWINRAKSFYSMNPCPTKDEVWILSYVLNTSFL DLSLNDSSERDNTKNKKGTENEKDVSNKSKEYLWLFKNPNKM REAGENKDKFINNFRENFTFTDYANLKVEIELWRKNNISNTLLITQK AKYPPEVKEANHPKFSVGYRKLVLHLELWPSKDENGDIPKIEGK DKSHNQILLDYLLEVCNEGKTTKKVIVPAWADGIKTELESKASIKVG DSTSSVLQRLMIKMAARRISQTLWIKINEQVRHDAYQKKNKAFKLL CEIDKNGEACKWLENYELFRRDDSGGEEYHISARAISCWKQILEEW QKNDSSKALREKVQVQAEDKFGDARLFEDLADDNARSVWLLPD GNKTPDILNWWCEYRTADIDESRFKIPCYCHPHFHPVVEYGKS NPQVIFSLKHDKARKNRIDNGWNPKNPRILALLLLDIVRQKSTLAPF VWESKRLWKDLGGDATVTYKIPRSDRMGLSSIGNIDYARPEVPFLKE KWNARLQSDRRTLEKLEKYWNPESMKWIDDGKFLIQSKWFITFGP DMETAEGPWKLYLKENINDNNYLGNRSKENQKRGYRAKKLLSGYP AGMRILSVDLGHRYAASCAIWETITKKQITEELAYQPDKNSVFEHSC KTIDKKIKNTVYRRIGDDSIDAPWAKLEKQFTIKLQGEDKSCYLLRSDE KELFRSILSKLSCLNNDTGHNIEMIENLLRIVKAKIYRQGILARISYSM TAQYKPGKGGQKSPLSDEDKIHYLSENLAAWSALMGNQEWNEDGI SDWYKKYISHLVSGPKPKEGNRKS DRDKIIEYFLPAARKLYDDNETRI NIHDLFKELWDENNQLSAVLKEIKKIILPKGIRYFDKNNDS SRWKN NQSKLKQITHRGGLSLRRIVAIEGYKLAAYKNHPEPDNLTKNIPLP GDNSSAGFNQIRDTLERMKEQVRVKQIASRIVESALGLGIEGYKKRP LTPESKPCQAIVIEDLSHYRPDELQTRRENRRMLQWSSSKVKYLSE ACEMHDVLLVEISPEYTSRQDSRTGVAGLRCIDINIREFLKSSSWQ

		NKIKTIQMKPTNKKSNLDQYLIELNESLGERYKDKVIPSDKFVRIPRKG GDIFVSSSKESPVSQGIQADLNAAANIGLKALLDPDWAGAWWYILIE AKSNHVIPYGGKYKGAECRLDFKFSGLNQVMKNMNLWRDLQS QFSSSEDKWMSYKEYNELTEKRVINILRERAGLELIEE
169	Cas12	MPTRTINLKMVLGRKDDTAELRRALWTTHEHVNLAVAEVERVLLRC RGRSYWTLDRRGDPVHVPESQVAEDALAMAREAQRNGWPVVG EDEEILLALRYLYEQIVPSCLLDDLKPLKGDAQKIGTNYAGPLFDSDT CRRDEGKDVACCGPFHEVAGKYLGAPEWATPISKQEFDGKDASHL RFKATGGDDAFFRVSIEKANAWYEDPANQDALKNKAYNKDDWKK EKDKGISSWAVKYIQQLQLGQDPRTVEVRRKLWLELGLPLFIPVFD KTMVGNLWNRLAVRLALAHLLSWESWNHRAVQDQALARAQRDE LAALFLGMEDGFAGLREYELRRNESIKQHAFEPVDRPYVVSGRALRS WTRVREEWLRHGDTQESRKNICNRLQDRLRGKFGDPDVFHWLAE DGQEALWKERDCVTSFSLNDADGLLEKRGYALMTFADARLHPR WAMYEAPGGSNLRTYQIRKTENGLWADVLLSPRNESAAVEEKT NVRLAPSGQLSNVSFDQIQKGSKMVGRCRYQSANQQFEGLLGGAE ILFDRKRIANEQHGATDLASKPGHVWFKLTDVRPQAPQGWLDGK GRPAPPEAKHFKTALSNSKFADQVRPGLRVLSVDLGVRSFAACSV FELVRGGPDQGTYPFAADGRTVDDPEKLWAKHERSKITLPGENPS RKEIARRAAMEELSLNGDIRRLKAILRLSVLQEDDPRTEHLRLFME AIVDDPAKSALNAELFKGFGDDFRSTPDLWKQHCHFFHDKAEKV AERFSRWRTETRPKSSSWQDWRERRGYAGGKSYWAVTYLEAVRG LILRWNMGRGTYGEVNRQDKKQFGTVASALLHHINQLKEDRIKTGA DMIIQAARGFVPRKNGAGWVQVHEPCRLILFEDLARYFRTRDSRR ENSRLMRWVSHREIVNEVGMQGEYGLHVDTEAGFSSRYLASSGA PGVRCRHLVEEDFHDGLPGMHLVGELDWLLPKDKDRTANEARRLL GGMVRPGMLVPWDGGELFATLNAASQLHVIHADINAQAQNLQRRF WGRCGEAIKIVCNQLSVDGSTRYEMAKAPKARLLGALQQLKNGDA PFHLTSIPNSQKPENSYVMTPTNAGKKYRAGPGEKSSGEEDALDI VEQAEELAQGRKTFFRDPGSGVFFAPDRWLPSEIYWSRIRRRIWQVT LERNSSGRQERAEMDEMPY
170	Cas12	MVTRALNLKLVVPRRPGELTKAEALWSTHDIVNRATSYYESQLLLCR QQDYQTRELTSAGDQAPDLDALIANARDNRNRYRGLEKPPVREK LRNLYEAIVPPAIGKTGTAQAVGAFVSPLLDADSRGFTEIFDKIEALPN WVDGVRAEEDALEAAADWLKSPQGKERLRPTGAPPTWIKLAKKK DAGWAAAFVADIDKKLKEVEGTPTLMQELRALGVMPLFPSFFASRI AGHKGAVSTWDRALRLAVAHLLSWESWVELAAKEHAARVAKLEK

		FRDDNILGEIADAVEALRLYEKERTTELQQKAQLDAEEVRTTSRTIRG WVDLREKWLKTDASPDALISLVAAEQKRKSGKFGDPQLFRWLAKPE NHFWNKPDPDFPPSLFASLRMIEGLVERSKETAWMTLPDARLHPR SSQWEPHGGGNLKTFRLEQEGGSLSVTLPLLRSKGDDSYVEEEHA FSLAGSKQIPNASLDVRRNKYCLSYRTPTGEEAEAVVGSADLLLDWY FLQQRSEHRPEEGDIGPAFLKLALDITPIDPVWGEREKTPIHHFKTA SGKNTRHADGVAPGFRMLAVDLGIRLATCSVFELKATAPAGRLSFP IAHLDLHAVHERSFTLTLDGEDPDRDAERWRENKSAELRRLRMGLT RYRNIRNMREDAPDEREVLLDQEKVQEHGWAFEEPLLRELAKHK DTPEPIWEAELTKALAQFRSDFGVIVGEWRRSNRARSTDSHAGKSM WAIDHLTNSRRFLMSWSLLSKPGQIRRLDRDKQGVFAKHLLDHLEG LKADRLKTGSDLIVQAARGFRRDKRGNWHKAYKPCHGILFEDLSRY RMRTDRPRRENSQLMKWAHRAVPKEVGMQAEVYGIRVEDTGAA FSSRFHAASHTPGIRMHPIQKQDLENEWLLDEIEKQNSGVKRRELKL GQLVQLNGGELFACVTASGVKTLHADINAAQNLQRRFFTRHGDFAF RIVARKVLVDEEEVWVPRSLGKRLLGALGSHGKLVPTGHESGSCRFE EITTRAWSKLSGEKLSDDRVGNEEDQIIASIEEEALERTGEVVVFFRD PSGQVLPRDLWYPSKTFWSIVKSTTLSKLKAAP
171	Cas12	MEDKQFLERYKEFIGLNSLSKTLRNSLIPVGSTLKHIEYGIIEEDSLRA QKREELKGIMDDYYRNYIEMHLRDVHDIDWNELFEALTEVKKNQ DDAKKCLEKIQEKKEIYQYLSDDAVFSEMFKEMISGILPDFIRC EEYSEEEKEELKTVALFHRFTSSFNDFLNRKNVFTKEAIATAIGYRV VHENAEIFLENMVAFAQNIQKSAESQSIIERKNEHYFMEWKLSHIFTA DYMMMLMTQKAIHYNEMCGVVNQHMKEYCQKEKNWNLYRM KRLHKQILSNASTSFKIPEKYENDAEEVYESVNSFLQNVMEKTVMERI AVLKNNTDNFDLSKIYITAPYYEKISNYLCGSWNTIADCLTHYEEQQI AGKGARKDQKVKA AVKADKWKSLEIEQLLKEYARAEVKKRPEEYI AEIENIVSLKEVHLLEYHPEVNLIENEKYATEIKDVLNMYELFHWK WFYIEEAVEKEVNFYGELEDDLYEEIRDIVPLYNKVRNYVTQKPYSDTK IKLNFGTPTLANGWSKSKEYDYNAILLQKDGKYYMGIFNPVQKPEKE IIEGHSHPLEGNEYKKMVYYYLPSANKMLPKVLLSKKGMEIYQPSYI INGYKERRHIKSEEKFDLQFCHDLIDYFKSGIERNPDWKVFGFHFSDT DTYQDISGFYREVEDQGYKIDWTYIKEADIDRLNEEGKLYLFQIYNKD FSEKSTGRENLTMYLKNLFSEENIREQVLKLNGEAEIFFRKSSVKKPII HKKGTMLVNRTYMEEMHGESVKKNIPEKEYQEINYMNHRWKGE LSAEAEKYLKAVCHETKKDIVKDYRYSVDKFFIHLPTINYRASGKEA LNSVAQRYIAHQNDMHVIGIDRGERNLIYVSVINMQGEIIEQKSFNV VNKYNKEKLEREQNRDEARKNWKEIGQIKDLKEGYLSGVIHEIAK MMIKYHAIVAMEDLNYGFRGRFKVERQVYQKFENMLIQKLNLYLV FKDRSADEGGVLRGYQLAYIPDSVKKLGRQCMIYFVPAFTSKID

		PATGFVDIFNHKAYTTDQAKREFILSFDEICYDVERQLFRFTFDYANF ATHNVTLARNNWTIYTNNGTRTQKEFVNRRVRDKKEVFDPTKMLK LLELEGVEYQSGANLLPKLEKISDPHLFHELQRIVRFTVQLRNSKNEE NDVDYDHVISPVLNEEGKFFDSSKYENKEEKESLLPVDADANGAYC IALKGLYIMQAIQKNWSEEKALSPDVLRLNNNDWFDYIQNKRYR
172	Cas12	MAQASSTPAVSPRPRPRYREERTLVRKLLPRPGQSKQEFRENVKKLR KAFLQFNADVSGVCQWAIQFRPRYGKPAEPTETFWKFFLEPETS PNDSSRSPFRRRLQAFEEAAGINGAAALDDPAFTNELRDSILAVASRP KTKEAQLFSRLKDYQPAHRMILAKVAAEWIESRYRAHQNWERN YEEWKKEKQEWQNHPELTPEIREAFNQIFQQLVKEKRVRICPAA RLLQNKDNCQYAGKNKHSVLCNQFNEFKKNHLQGKAIKFFYKDAEK YLRGGLQSLKPNVQGPFRDWNKYLRMYMNLKEETLRGKNGGRLPH CKNLGQCECFNPHTALCKQYQQQLSSRPDLVQHDELYRKWRREYW REPRKPVFRYPSVKRHSIAKIFGENYFQADFKNSSVGLRLDSMPAGQ YLEFAFAPWPRNYRPQPGETEISSVHLHFVGTTRPRIGFRFRVPHKRS RFDCTQEELDELRSRTFPRKAQDQKFLEAARKRLLETFPGNAEQELR LLAVDLGTDASARAAFFIGKTFQQAFLKIVKIEKLYEQWPNQKQAGD RRDASSKQPRPGLSRDHVGRHLQKMRAQASEIAQKRQELTGTPAP ETTTDQAACKATLQPFDLRGLTVHTARMIRDWARLNARQIIQLAEE NQVDLIVLESRGRPPGYENLDQEKRRVAFFAHGRIRRKVTEKAV ERGMRVVTPYLASSKVCAECCRKKQKDNKQWEKNKKRGLFKCEGC GSQAQVDENAAARVLGRVFWGEIELPTAIP
173	Cas12	MAVKSIKVKLRLSECPDILAGMWQLHRATNAGVRYYTEWVSLMR QEILYSRGPDDGGQQCYMTAEDCQRELLRRLNRQLHNGRQDQPG TDADLLAISRRLYEILVLQSIGKRQDAQQIASSFLSPLVDPNSKGGGRGE AKSGRKPAWQKMRDQGDPRWVAAREKEYQRKAVDPSKEILNSLD ALGLRPLFAVFTETYSRSGVDWKPLGKSQGVRTWDRDMFQQALERL MSWESWNRRVGEEYARLFQQKMKFEQEHFQSHLVKLARALEA DMRAASQGFEAKRGTAHQITRRALRGADRVFEIWKSIPEEALFSQY DEVIRQVQAEKRRDFGSHDLFAKLAEPKYQPLWRADETFLTRYALY NGVLRDLEKARQFATFTLPDACVNPIWTRFESSQGSNLHKEYEFLDH LGPGRHAVRFQRLLVVESEGAKERDSVVVPVAPSGQLDKLVLEEE KSSVALHLHDTARPDGFMAEWAGAKLQYERSTLARKARRDKQGM RSWRRQPSMLMSAAQMLEDQAGDVYLNISVRVKSPSEVRGQR RPPYAALFRIDDKQRRVTVNYNKL SAYLEEHDPKQIPGAPGLLSGLR VMSVDLGLRTSASISVFRVAKKEEVEALGDGRPPHYPIHGTDDLVA VHERSHLIQMPGETETKQLRKLREERQAVLRPLFAQLALLRLLVRCG

		AADERIRTRSWQRLTKQGREFTKRLTPSWREALELELTRLEAYCGRV PDDEWSRIVDRTVIALWRRMGKQVRDWRKQVKSAGKVKVKGQYL DVVGGNSLAQIDYLEQQYKFLRRWSFFARASGLVVVRADRESHFAVA LRQHIEENAKRDRLKKLADRILMEALGYVVEASGPREGQWTAQHPPC QLIILEELSAYRFSDDRPPSENSKLMWGHGILEELVNQAQVHDVL VGTVYAAFSSRFDARTGAPGVCRRVPAFVGVATVDDSLPLWTEF LDKHRLDKNLLRPDDVIPTGEGEFLVSPCGEEAARVRQVHADINAA QNLQRRWLWQNFIDITELRLRCDVKMGGEGTVLVRVNNARAKQLF GKKVLVSQDGVTFERSQTGGKPHSEKQTDLTDELELIAEADARA KSVVLFDRDPSGHIGKGHWIRQREFWSLVKQRIESHTAERIRVRGVGS SLD
174	Cas12	MSNPNIPIPNITLRRDDVNNLLMSSIAMMELGLAHIIIAEGEKIQF ALGTLQGASGPPATLQQVLEVNQSTQAMLDITFRQEMMLDCLKT ATNIPTLRGPTGPVGPTGAPGGVISINGQTGVVTLDAASGVMPFM REQSTSSLDYKDPGIYXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXGATGATGATGATGPQEPRALREPRAPQARREPRGLLEPQVL RGPQEPRALREPRAPRALREPRALRALRALQELRAPRALRGLQEPRV LQGPRERQVRPEPRVLQGPRERQVRQGLQGLLEPRAKRERQVRPE PREPQERQAPLVQQALLEPQALLGQAL
175	Cas12	MIKKSNIWFQFTGLYELSKTLRFELKPVWETLNILEKDWVSQKDEKE ENYNKIKVFFDSLHREFVKQSLNWWYELLENFYNSYIELNKNENKK NKSQKLFEKSSKELKELVSFFEWKWNWQKYSFLKKWWIDVL NEKEVLDLMWEFYPKEKELFKKFDKFFTYFSNFKESRKNFYADDWR AWAIATRVIDENLITFIKNIEDFKKFNNSDFIENGFSWIKIKINWFT LEEKQVFDLDFYNNCLLQDWIDNKNILWWFSEENWNKIQWINEK INLFKQNNKNTNSKDVKFRFKLLYKQILSEKEKLIFVDEIENDEKLIN IKESKNNNLIKVEKAEITENFIKNNETFELDKIYLSKISINTISNKFSSW DYILKEGFDKWEIKEFISFEDLKNFAGKIKYENLEDIFKSNIYTDYIAIN WEDLYKNFLNIFLYEFKQNNINEINFYNSELEKLFLEKFEKTETQVQIKN YFDSVLSLYKMTKYFALEKGGKKIEDLETNNFYNDFVYEDFEIWK

		DYNLVRNFITKKQVKTDKFKLNFENSQFLTGWWDKDEKERLWIILKK DEKYLLWILKNNKIFNSYNYESWDFYEKMSYKQLNNVYRQLPRFAF SKAKREVYWITPELEQIKEEFDIFQKNKEKWEKFDIEKLKKLINCYKK WFIKTYENEFDELEKIKNTDYLDLATFYDEIEQKTYKIDFNKISENFINAK VNSWELYLFQIYNKDFSETKKAWSKENIHTKYFKLLFDEKNLEKLVIKL SWWAEMFFREKTEKLTCLDKSWKEVLEHRRYSKDKIMLHLSITLN ANKWDSFWFNKVMNEYLNKNEDIKIIWIDRGEKHLAYYSVIDKNW KIEEIDTLNIIKSSDWKITNYLEKLEKIESSRKDSRVSWWEIENIKELKN GYISQVVNKLAEIIKYNAIIVFEDLNIWFKRWRQKIEKQIYQKLELAL AKKLNYLTQKDKNDNEVLWNLKALQLVPKVNDYQDIANYKQSGIM FYTRANYSTTCCPCWFRKNIIYSNSDTKEKQKDFEKIDIKFDGEKFI FSYEIIQDKKAKQKSNKTNFSVNSNFSRFKYNSSKMLVEEVNLEL QNLFKDIDLKWDINKQILEKDSYFYKSLTYFFNLILQLRNSDSKNDIDY ITCPCSNYHSDWFGLEYNADANWAYNIARKWIIIMLDRIEKNFEK PDLYVSDIDWDNFTQK
176	Cas12	MIKKS NFQFTGLYELSKTLRFELKPVWETLNILEKDWVSQKDEVE ENYNKIKVFFDSLHREFVKQSLN WYLELLENFYNSYIELNKNENKK NKSLQKLF EKSSKELKKELVSFFEWKWNWQKYSFLKKWWIDVL NEKEVLDLMWEFYPKEKELFKKFDKFFTYFSNFKESRKNFYADDWR AWAIA TRVIDENLITFIKNIEDFKKFNNSDFIENGFSWIKINWFT LEEKQVFDLDFYNNCLLQDWIDNYNKILWWFSEENWNKIQWINEK INLFKQNKQNTNSKDVKFPFKLLYKQILSEKEKLIFVDEIENDEKLINF IKESKNNNLIKVEKAIEITENFIKNNETFELDKIYLSKISINTISNKKFSSW DYILKEGFDKWEIKEFISFEDLKNAFGKIKYENLEDIFKSNIYTDYIAIN WEDLYKNFLNIFLYEFKQKQININEINFYNSELEKLFLEKFEKTETQVQIKN YFDSVLSLYKMTKYFALEKGGKKIEDLETDNNFYNDFFVYDEIWK DYNLVRNFITKKQVKTDKFKLNFENSQFLTGWWDKDEKERLWIILKK DEKYLLWILKNNKIFNSYNYESWDFYEKMSYKQLNNVYRQLPRFAF SKAKREVYWITPELEQIKEEFDIFQKNKEKWEKFDIEKLKKLINCYKK WFIKTYENEFDELEKIKNTDYLDLATFYDEIEQKTYKIDFNKISENFINAK VNSWELYLFQIYNKDFSETKKAWSKENIHTKYFKLLFDEKNLEKLVIKL SWWAEMFFREKTEKLTCLDKSWKEVLEHRRYSKDKIMLHLSITLN ANKWDSFWFNKVMNEYLNKNEDIKIIWIDRGEKHLAYYSVIDKNW KIEEIDTLNIIKSSDWKITNYLEKLEKIESSRKDSRVSWWEIENIKELKN GYISQVVNKLAEIIKYNAIIVFEDLNIWFKRWRQKIEKQIYQKLELAL AKKLNYLTQKDKNDNEVLWNLKALQLVPKVNDYQDIANYKQSGIM FYTRANYSTTCCPCWFRKNIIYSNSDTKEKQKDFEKIDIKFDGEKFI FSYEIIQDKKAKQKSNKTNFSVNSNFSRFKYNSSKMLVEEVNLEL QNLFKDIDLKWDINKQILEKDSYFYKSLTYFFNLILQLRNSDSKNDIDY

		ITCPCSNYHSDKWDFQGLEYNADANWAYNIARKWIIMLDRIEKNFEK PDLYVSDIDWDNFTQK
177	Cas12	MATRSFILKIEPNEEVKKGLWKTHEVLNHGIAYYMNILKLRQEAIYE HHEQDPKNPKKVSKEIQAEIQLWDFVLKMQKCNSFTHEVDKDVVFN ILRELYEELVPSSVEKKGEANQLSNKFLYPLVDPNSQSGKGTASSGRK PRWYNLKIAGDPSWEEKKKWEEDKKKDPLAKILGKLAEYGLIPLFIP FTDSNEPIVKEIKWMEKSRNQSVRRDKDMFIQALERFLSWESWNL KVKEEYKVEKEHKTLEERIKEDIQAFKSLEQYKERQEQLLRDTLNT NEYRLSKRGLRGWREIIQKWLKMDENEPSEKYLEVFQYQRKHPRE AGDYSVYEFLSKKENHFIWRNHPEYPYLYATFCEIDKKKKDAKQQAT FTLADPINHPLWVRFEERSGSNLNKYRILTEQLHTEKLKKLTVQLDR LIYPTESGGWEEKGKVDIVLLPSRQFYNQIFLDIEEKGKHAFTYKDESI KFPLKGTGGARVQFDRDHLRRYPHKVESGNVGRIFYNMTVNIPT ESPVSLSLKIHRDDFPKFVNFKPKELTEWIKDSKGKLLSGIESLEIGLR VMSIDLGQRQAAAASIFEVVDQKPDIEGKLFFPIKGTLYAVHRASF NIKLPGETLVKSREVLKAREDNLKLMNQKLNFLRNVLHFQQFEDIT EREKRVTKWISRQENS DVPLVYQDELIQIRELMYKPKDWVAFKQL HKRLEVEIGKEVKHWRKSLSDGRKGLYGISLKNIDEIDRTRKFLLRWS LRPTEPGEVRRLEPGQRFAIDQLNHLNALKEDRLKKMANTIIMHAL GYCYDVRKKKWQAKNPACQIILFEDLSNYPYEERSRFENSKLMKW SRREIPRQVALQGEIYGLQVGEVGAQFSSRFHAKTGSPIRCSVVTK EKLQDNRRFFKNLQREGRLTLDKIAVLKEGDLYPDKGGEKFISSKDRK LVTTHADINAAQNLOKRFWTRTHGFYKVYCKAYQVDGQTVYIPESK DQKQKIIIEFGGYFILKDGVEWGNAGKLKIKKGSSKQSSSELVDS ILKDSFDLASELKGEKLMYRDPGSGNVFSPDKWMAAGVFFGKLERIL ISKLTNQYSISTIEDSSKQSM
178	Cas12	MAESMYNQNNINQKSTETPTTEEDALGIKNPLLTPPTLQGNFSLQSI SPLGSRINLINWSLISPNQTLLQNFQDNENWQDSSISEFRPFKNSL TENSPIEPQSDKTLPSVPIQLSSELPQQPPETSFDSESPQPPEPTP SSDSESPIGQTENIFPFQIDQKTRRNSVIQNSKSSISHFFQKKSEFPRE KISQENVNKLTKSAENQDISTTEESVINSIETNDLQTINPTDIPNPEIP VSTLQKQPDSTIDNIPQTESVSTINPTDIPXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

		XXXXXXXXXXXXXXXXXXXXXXXXXXXXXSKNNRIPQLITFLKLNQY QQLILQIFLTQKFSFQLSKNNRIPPLITFLKLNQYQQLIPRVLLHQKFLF QLFKNNRIPPLITFPKLNQYQQLIPRIFLTQKFPFQISRNNRIPQLITFP KLNQYQ
179	Cas13	MGAIKNKHIFAAAYANLAIDGLIKTLNFIKKLDTQKQLSSWDIKHVIT LIDSIFDQNPQNNLEQVVEGYLPWIKPIEMKTPKKGERQSDKLCIEY KTIITAFASLLNDVRNYYTHYYHDPICIYPGGYDIPSSLNCIYDSAINIK ERFQAEKEMEHLRRYTRKKGRVVLKTEDDHFYTLANNNDLSEKG YAFFISMFLERKYSYFLKLSGFKRGDSLQYRLTLEVFTALSTKPPVER LRTTKDTKQDRALDILNELSKIPIELYQTLEPKYREMYNETLQPTDAE DPYGLPDRSRIRFRSRFEAFALHFLDKQADFKEIGFYTYLGNFYHNGY QKTRVDRETCDRYINFQLAGFCKNIQDISAKKLEALNVKSIDISTDSI PDINSFEPYLVQSTPHYIVNGNNIGIKVLPEGKDTYPTIDEKGAKMPI ADFWLSKYELPAMLFYTYLRNNNIHKSHCPLSVKDIERSIHKSTKQK HPEERSELMRRVMKAIFWTD SKLNEVERIKSQSAFGKRQHEILKA GRIAETLVRDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRNRD LTEIFRAGLINSSNPHFLAQIGTNYTSLIEFYIAYLKERKVYSRIQKK ILQGKLNQCHPLRDLQREPKNPQDKKEAIFLPRGLFNEAIINCLKSK LKQLIESPTREKSPALNVSYLIQNYFRTYFEDQSQEFYAQPRNYRFD KLSPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLLEKEDRLYRKN YNEICDNESIIRLYQIQDILLFMMTKEYLPSDLYNRINKYKLENVKGIL NERVSYLIDLNLPLKIQGEDIKIDYGKLFYIHHDRISLNLKVLKVKRN NSISSSVKIQPYENYKRECLDFEEAQIPIIHSFEIAMVSMFPDLKKA TPGNYYDFNELITEYEKRTKQKIGSSFLIKTRNMFLHDKYEAECIKEIS DDFVYAKKIIAEFKMKIENIKLEDLSNDSSA
180	Cas13	MARDNFLNTIKLLADKMKLGAISGFGKDGNEVNDINKLFGDKNTYA NIENVVEFYFPWIKALEGRFSLDKGDRNLNDMKMFYKSVLTAFFTA VDSLNRNKYTHYSHKDLNIREIKIECTLGKDYCIGLLNALDCIYDSAVN LLKLRFMVGEDVAHLRRCKAVNKKVVVRTEKDGFFYRLSDNGGVT EKGVIFIASMFNLNRKYGFLFKQLEGFKRSDEKRYRLTLEAFLAFSNIK PVDRLKSDKLDASLGLDMLNELTKIPKELSETLSVDCLYKYLASDGE DDLRSRIRYQDRFVPLALEFISQSDEFKDFRFTYVGNVYVYKGYIKRLI DGTDKERYLSDRLCGFYKSVNDASSDAIAQKYGVEIKDSNEPDYMLP DSFRPHVLRATPHFVINNNIGIKICGNDCLPIVNGKGVESPEPDYW LSIYELPAMLFYAYLREKNGKRFKDYKSIRELIEGVEKKADEKNDRD GALMARHIDKEIWTQTKLDEVKRLEEKVAAYGKKGRVVLKSGRM ADLLAHDMVRLQPATKGSKITGVNFQALQVSLAYFKRDILADVFS

		RAMLTGNGHRHPFLYRIDVSHCSSLRDFYVAYLGERRKYFEDVAKKI AKNKLNTPCHILRRLOREGSGEEAGKDVKPKFLPRGIFTDSIKNCLEQ SKLNIYIRNARNVDVKPAINAAYLILMYKEIEKGEFGFYGEKRRYDIL EEGKPLDLAERKKALASIKPAKIDVSEANMPMSKEEHLMRKRYHAV CNNESAIRMYQVQDILLLLMAKDIFKKALSEGVMSSKIGLENLNGIF DAPVNFVKNFNIDNIKTATGIIKIKNYGKVCRLGTDFKFNSLIKAFHKVY SKSVEMDYSYDLKEEEFEKYRLNMVKLCREVERGITEDLHLSLDGKS HLSFNDDVIKPYNDKYNVFNNGDDLTFINARNMFMHGDYKYECVK YVVSEHFKGSNDVVSFAKETYGHFCNLLES MRKKTGLRID
181	Cas13	MKKKISLKEQRNTKKAENKLKYQKAQAERAAAAQQTAAAGAESEEN PCFDVVKDTKRKALNPLHVEIEAPS AKKSSVKANGLKSLLLTDGKTV MTSFGRGSEANVEKRFDGTGKTFRDPELFS AKPLETGYRIQRFNA SPKDALAYRPAGVRPDQJGAKAALEKRYFGKETPGDNHIVQIAYQI QDIEKLLAVYISNIIYAVNNVTGVSAMKDSKGRPVDLLGDY GILGEEG LTKRLQRIPEQADEEAKALQAFLCSERLSYFGKEFCLVRNSPKQPDKE EKRYQKLMRVLCLLGELRQFLVHGKKKEKEFAWLYRLDRQLSQEYR KLLGEFYDAQVDKVNKSFLTNSTVNLEVLFRALKTGTDPERKTVTQE YYQFTVRKEDGNLGFSLKTLREILLSAYKHEVRDKEYDSIRHKLYQLFS FALYHYKTGVGAERREAFVAKLRAVMTAEAKQRAYADEAAEIWN DEGSGIRAAFLILEAVDFGSAVKGIKARSSVAGDKRFAEWLEEVIR PEGVSCFTKLMYLLTRFLDGKEINELLTGLINKLENIQSFLDVMQQEH AETGLSDAFSFFEYSGEIAAELRMTRSFARMAAADPEAKRFMVVDG AKLLGFNPKDTESEDEGIIRAIYGDACA EYLQFSEEEKEAFYVQEGLY GKEREKFSYAYFHTDTS LRNFIAKNVVESARFRYVIRYVSPEIARKYA RQEALVRFALHRVPLLQLRRYQSCCGPKKDPDAAECVDFLAGVVN RVDFANFTDVRTGDSSKSEQEKKQYQAI VGLYLTVVYVWVKNLVN VNSRYVMAFHILERDVTLLGKRLFVGGMKAEDPFLTDGYVSRQD AYVRKRIGENKRANRHGLNCVLENRNALGSDPASTDAAASLIWSYR NAAAHLTAVAAAQEQYVSELREIHSYFEVYHYAMQRYLKSGAEFAELV SKNGPASGKIAAWANAVDRCHSFCKDWLWLLNVFPAYNPARYKN LSIANLFDKNEAAPVTEDASEQKEDE
182	Cas13	MGAIENKHIFAAYANLAIDGLIKTLNFI AKKLD TQQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYYHDPICIYPGGYDIPSSLNCIYDSAINIIE RFQAE EKEMEHLRRYTRKKGRVVLKTEDDHFYTLANNNDLSEKGY AFFISMFLERKYSYFLKKLSGFKRGDSLQYRLTLEVFTALSTKPPVERL RTTKDQTKQDRALDILNELSKIPIELYQTLEPKYREMYNETLQPTDAED

		PYGLPDRSRIRFRSRFEAFALHFLDKQADFKEIGFYTYLGNYFHNGYQ KTRVDRETKDRYINFQLAGFCKNIQDISAKKLSEALNVKSIDISTDSIP DINSFEPYLVQSTPHYIVNGNIGIKVLPEGKDTYPTIDEKGAKMPIA DFWLSKYELPAMLFYTYLRNNNIHKSHCPLSVKDIIERSIHKSTKQKH PEERSELMRRVMKAIFWTDSKLNEVERIKSQKSAFGKRQHEILKAG RIAETLVRDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRRNDL TEIFTRAGLINSSNPHFLAQIGTNYTSLIEFYIAYLKERKVYFSRIQKKI LQGKLNQCHPLRDLQREPKNPQKEEEAIFLPRGLFNEAIINCLKSKL KHLIESPTREKSPALNVSYLIQNYFRAYFEDQSQEFYAQPRNYRLFDN LSPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLLEKEDRLYRKNY NEICDNESIIRLYQIQDILLFMMTKEYLPSDLYNRINKYKLENVKGILN ERVSYLIDLNPLKIQGEDIKIKDYGKLFYIHHDRISLNVLSKVKRNN SISSSVKIQPYENYKRECLDFEEAQIPIIHSFEIAMVSMFDPDLKAT PGNYYDFNELITEYEKRTKQKIDSSFLIKTRNMFLHDKYEAECIKEISD DFVYAKKIIAEFKMKIENIKLEDFSNDSSA
183	Cas13	MGAIENKHIFAAYANLAIDGLIKTLNFIKKLDTQKQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYYHDPICIYPRGYDIPSSLNCIYDSAINIIE RFQAEKEMEHLRNYTLVNNNGLSEKGYAFFISKFLERKYSYLFKKL SGFKRGDSLQYRLTLEVFTALSTKPPVERLRTTKDQDRALDILNELS RIPIELYQTLEPKYREMYNETLQPTDAEDPYGLPDRSRIRFRSRFEAFALHFLDKQADFKEIGFYTYLGNYFHNGYQKTRVDRETKDRYINFQLAGFCKNIQDISAKKLSEALNVKSIDISTDSIPDINSFEPYLVQSTPHYIVNGNIGIKVLPEGKDTYPTIDEKGAKMPIADFWLSKYELPAMLFYTYLRNNNIHKSHCPLSVKDIIERSIHKSTKQKHPEERSELMRRVMKAIFWTDSKLNEVERIKSQKSAFGKRQHEILKAGRIAETLVRDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRRNDLTEIFTRAGLINSSNPHFLAQIGTNYTSLIEFYIAYLKERKVYFSRIQKKILQGKLNQCHPLRDLQREPKNPQKEEEAIFLPRGLFNEAIINCLKSKLKHLIESPTREKSPALNVSYLIHNYFRAYFEDQSQEFYAQPRNYRLFDKLSPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLLEKEDRLYRKNYNEICDNESIIRLYQIQDILLFMMTKEYLPSDLYNRINKYKLENVKGILNERVSYLIDLNPLKIQGEDIKIKDYGKLFYIHHDRISLNVLSKVKRNNSISSSVKIQPYENYKRECLDFEEAQIPIIHSFEIAMVSMFDPDLKATPGNYYDFNELITEYEKRTKQKIDSSFLIKTRNMFLHDKYEAECIKEISDDFVYAKKIIAEFKMKIENIKLEDFSNDSSA

184	Cas13	CILDFFTQDKAIAEYQLGVEFLQKNLPVIRYLYLPTSHKRFENVPKNQ LISEQRNYFKNSLKVLNKLRDYNFYTHHFKPIPVFPETYKLLDDL LAVANDVKKHRMKT DASKQLKKGLIEELAQLKLEDLKKLKREG KKVNLNDKEAITNAILNDSFSHLLPKENTISKYYSAPTEDIDTENGVT ISESGIIFLLGLFLT KQSEDLRSRVKGFKAKLIVNPENPINKKNSLKY MATHWVFGYLGFKGLKNRFTTTFTKDTLLAQIVDELSKVPDELYQVL PEELKNEFLEDMNEYLKEENSESLDKATVIHPVIRKRYENKFAYFALR FLDEFVDFTLRFLHLGNYVHDKREKPIEGTKYVTERIVKEIKAFK LSEAAQLKQKYFEEKENHQSIGLQLYPNPSYNFVGNNIPIHLNLNEH FFPKEVKIVAGRLKKRNSSYKSDHPPEYKVRTDNKIKPDAILQDLGKP EKLAPVAMLSLNEPALLHLVLTKKTPEEIEIIIAQKIAERYNVLTNYKA GDDISKGQITKNLLKAKQKKEVNLDKLQLAIEKIAVTNDKLQTIALHI KERNDPKQKRKYVFTNKEIGLQVTWLANDLKRFPMPKGSQRQNWGRG QHHSQQLQKSLAFYDIQPKPEPLSLEEVDKFKNEAYLWNNGIRRSFD KRDFISFYTSYLNRRKETFRFKDQLNGIRSNNKILDKFIKQQLWNL FHKRLYVIDTIEEQVEKLLVKPMQFPKGVFDHKPTYIKGKSIQENPEC FADWYVAWNQHTDYQKFYSWDRDYKSAYLSGEQEKTEKRFIRVQ GSKINKVKQQDVLLAKMASIIFNELYLPEDAHLDLNLSDIYKTQTER KAEIEAALIQSHKTTGDN SANI IKSTS AWTLTPYCSKNIEPQVKLKE LGKFKKFIASQKVQTLFEYKPKIWNKTELEEVLELKANSYEVIRRDYL LKSQEF EK YMIKKLPTLIDTNEHPNFNKYLTFLKSLELVSEDAKWLI SKKDFDTPIDELKKQSKIMEKAFLVMIRNKFSHNQLPRKIYYDEIYK NVPNAV SINFNELFLEYTNQTILEFK
185	Cas13	NRRDMEASPGRLARYIVLKTLYERAFPRWLEAREAE TLNGWIGRAA DRATVAARHINKDENAAAARMAGLVRLADGKGIADFTDRLAAETAS EYRVQRGYDSDPAVARKQAKHIEDLRCDVVGQAFAEYLADVARKL AWTMNDPPGGGPLDEKKASLETAAPPAEDAGAEAEEDWLARLYFL LHMLPVEEVGGLRHQLRKWSVLEREPDSVLEREPDADVEAIERILGL YLDMDHDAKFEGGDGVAGAEALTDLFTSPAQFRRVCPEDGAGNGG HVPWRGLREMLRFGGGEPRLMWAFRKWPIGDGMVDGLNALEAT VAE AHKQREDLHAKWAGKKGFSRKDKDEYRAALETVVVHRHLAAH VQLVNHARLHRLAMAVLARLADYAGLWERDLYFTTLALIRLENGKP EDVFRSRELEWLREGRIVDALKEKKNADGSEPAVG TALQRLF GKGI LTGGGT VSVRRDLLHFNMLQRKANEPFNLTAVNDTRKLMAYDRK LKNAVSR SIIELLAREGLDLAWEMKDHQLAGAVLKTRQAVHLGGAK VGGGPITEDLHGPEFTAMAAALFGGEARAATDAAEAATGRPDRE RKSGGASPRPARPAKTLPAPTPRLLPAAGERVEGV LVEEKTRKGGW KAAVEIGGPRIVGDIFNSGEVPSDAEPGLEAEFVVRVANPANASFM WLSPDVEERLKKAAAPRRGGRPAGRQR

186	Cas13	MGAIENKHIFAAAYANLAIDGLIKTLNFIKKLDTQKQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYYHDPICYPGGYDIPSSLNCIYDSAINIIKE RFQAEKEMEHLRRYTRKKGRVVLKTEDDHFYTLANNNDLSEKGY AFFISMFLERKYSYFLKKLSGFKRGDSLQYRLTLEVFTALSTKPPVERL RTTKDTKQDRALDILNELSKIPIELYQTLEPKYREMYNETLQPTDAED PYGLPDRSRIRFRSRFEAFALHFLDKQADFKEIGFYTYLGNYFHNGYQ KTRVDRETKDRYINFQLAGFCKNIQDISAKKLSEALNVKSIDISTDSIP DINSFEPYLVQSTPHYIVNGNIGIKVLPEGKDTYPTIDEKGAKMPIA DFWLSKYELPAMLFYTYLRNNNIHKSHCPLSVKDIIERSIHKSTKQKH PEERSELMRRVMKAIFWTD SKLNEVERIKSQKSAFGKRQHEILKAG RIAETLVRDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRRNDL TEIFTRAGLINSSNPHFLAQIGTNYTSLIEFYIAYLKERKVYFSRIQKKI LQGKLNQCHPLRDLQREPKNPQKEEEAIFLPRGLFNEAIINCLKSKL KHLIESPTREKSPALNVSYLIQNYFRAYFEDQSQEFYAQPRNYRLFDN LSPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLEKEDRLYRKNY NEICDNESIIRLYQIQDILLFMMTKEYLPSDLYNRINKYKLENVKGILN ERSYILDLNPLKIQGEDIKIDYGKLFYIHHDRISLNKVL SKVRNN SISSSVKIQPYENYKRECLDFEEAQIQIPIIHSFEIAMVSMFPDLKAT PGNYYDFNELITEYKRTKQKIDSSFLIKTRNMFLHDKYEAEIKIEISD DFVYAKKIIAEFKMKIENIKLEDFSNDSSA
187	Cas13	MGAIENKHIFAAAYANLAIDGLIKTLNFIKKLDTQKQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYYHDPICYPGRGYDIPSSLNCIYDSAINIIKE RFQAEKEMEHLRNYTLVNNNGLSEKGYAFFISKFLERKYSYFLKKL SGFKRGDSLQYRLTLEVFTALSTKPPVERLRTTKDTKQDRALDILNELS RIPIELYQTLEPKYREMYNETLQPTDAEDPYGLPDRSRIRFRSRFEAFALHFLDKQADFKEIGFYTYLGNYFHNGYQKTRVDRETKDRYINFQLAGFCKNIQDISAKKLSEALNVKSIDISTDSIPDINSFEPYLVQSTPHYIVNGNIGIKVLPEGKDTYPTIDEKGAKMPIADFWLSKYELPAMLFYTYLRNNNIHKSHCPLSVKDIIERSIHKSTKQKHPEERSELMRRVMKAIFWTD SKLNEVERIKSQKSAFGKRQHEILKAGRIAETLVRDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRRNDLTEIFTRAGLINSSNPHFLAQIGTNYTSLIEFYIAYLKERKVYFSRIQKKILQGKLNQCHPLRDLQREPKNPQKEEEAIFLPRGLFNEAIINCLKSKLKHLIESPTREKSPALNVSYLIHNYFRAYFEDQSQEFYAQPRNYRLFDKLSPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLEKEDRLYRKNYNEICDNESIIRLYQIQDILLFMMTKEYLPSDLYNRINKYKLENVKGILNERVSYLIDLNPLKIQGEDIKIK

		DYGKLFYIHHDRISLNVLSKVKRNNSSSSVVKIQPYENYKRECLDF EEAQIQIPIHSFEIAMVSMFDPDLKKATPGNYYDFNELITEYEKRTKQ KIDSSFLIKTRNMFLHDKYEAECIKEISDDFVYAKKIIAEFKMKIENIKLE DLSNDSSA
188	Cas13	MGAIENKHIFAAAYANLAIDGLIKTLNFIKKLDTQKQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYYHDPICIYPGGYDIPSSLNCIYDSAINIIE RFQAEKEMEHLRRYTRKKGRVVLKTEDDHFYTLANNNDLSEKGY AFFISMFLERKYSYFLKKLSGFKRGDSLQYRLTLEVFTALSTKPPVERL RTTKDTKQDRALDILNELSKIPIELYQTLEPKYREMYNETLQPTDAED PYGLPDRSRIRFRSRFEAFALHFLDKQADFKEIGFYTYLGNYPFHNGYQ KTRVDRETCDRYINFQLAGFCKNIQDISAKKSEALNVKSIDISTDSIP DINSFEPYLVQSTPHYIVNGNIGIKVLPEGKDTYPTIDEKGAKMPIA DFWLSKYELPAMLFYTYLRNNNIHKSHCPLSVKDIIERSIHKSTKQKH PEERSELMRRVMKAIFWTDSKLNEVERIKSQKSAFGKRQHEILKAG RIAETLVRDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRRNDL TEIFTRAGLINSSNPHFLAQIGTNYTSLIEFYIAYLKERKVYSRIQKKI LQGLNIQCHPLRDLQREPKNPQEEAIFLPRGLFNEAIINCLKSKSL KHLIESPTREKSPALNVSYLIQNYFRAYFEDQSQEFYAQPRNYRLFND LSPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLEKEDRLYRKNY NEICDNESIIRLYQIQDILLFMMTKEYLPSDLYNRINKYKLENVKGILN ERSYILIDLNLPIQGEDIKIKDYGKLFYIHHDRISLNVLSKVKRNN SSSSVVKIQPYENYKRECLDFEEAQIQIPIHSFEIAMVSMFDPDLKKAT PGNYYDFNELITEYEKRTKQKIDSSFLIKTRNMFLHDKYEAECIKEISD DFVYAKKIIAEFKMKIENIKLEDFSNDSSA
189	Cas13	MGAIENKHIFAAAYANLAIDGLIKTLNFIKKLDTQKQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYYHDPICIYPRGYDIPSSLNCIYDSAINIIE RFQAEKEMEHLRNYTLVNNNGLSEKGYAFFISKFLERKYSYFLKKL SGFKRGDSLQYRLTLEVFTALSTKPPVERLRTTKDTKQDRALDILNELS RIPIELYQTLEPKYREMYNETLQPTDAEDPYGLPDRSRIRFRSRFEAF LHFLDKQADFKEIGFYTYLGNYPFHNGYQKTRVDRETCDRYINFQLAG FCKNIQDISAKKSEALNVKSIDISTDSIPDINSFEPYLVQSTPHYIVNG NIGIKVLPEGKDTYPTIDEKGAKMPIADFWLSKYELPAMLFYTYLR NNNIHKSHCPLSVKDIIERSIHKSTKQKHPEERSELMRRVMKAIFWT DSKLNEVERIKSQKSAFGKRQHEILKAGRIAETLVRDMLWLQPSKNN GRDKVTEPNFQAIQVSLAYFGIRRNDLTEIFTRAGLINSSNPHFLAQ

		IGTNYTSLIEFYIAYLKERKVFYSRIQKKILQGKLNIQCHPLRDLQREPN KPQEKEEAIFLPRGLFNEAIIINCLKKSCLKHLIESPTREKSPALNVSYLIH NYFRAYFEDQSQEFYAQPRNYRLFDKLSPNKGKSKSYLSLEQRIKKM EELRPSKIPVAEANKLLEKEDRLYRKNYNEICDNESIIRLYQIQDILLFM MTKEYLPDLYNRINKYKLENVKGILNERVSYLIDLNPLKIQGEDIKIK DYGKLFYIHHDRISLKNVLSKVKRNNSSISSVKIQPYENYKRECLDF EEAQIQIPIHSFEIAMVSMFDPDLKKATPGNYYDFNELITEYEKRTKQ KIDSSFLIKTRNMFHDKYEAECIKEISDDFVYAKKIIAEFKMKIENIKLE DLSNDSSA
190	Cas13	MEEANRYIYGAYFNMARDNFLNTIKLLADKMKLGATSGFGKDGNE VNDINELFGDKNTYANIENVVEFYFPWIKALEGRFSLDKGDRNLND MKMFYKSVLTAFFTAVDLSLRNKYTHYSHKDLNIREIKIECTLGKGDYC IGLLNALDCIYDSAVNLLKLRFMAGEYEVAHLRCKAVNKKVVVRTE KDGFFYRLSDNGGVTEKGVIFIASMFLNRKYGFLFLKQLEGFKRSDK RYRLTLETFLAFSNIKPVDRKSDKLDASGLDMLNELTKIPRELSETL SVDCLYKYLTSDEDDLRSRIRYQDRFVPLALEFISQSDEFKDFRYTY VGNVYKGYIKRLIDGTDKERYLSDRLCGFYKSVNDASSDAIAQKYG VEIKDSNEPDYMLPDSFRPHVLRATPHFVINNNNIGIKICGNDCLPIV NGKGVESPEPDYWLSIYELPAMLFYAYLREKNGKLLKDYKSIRELIED VEKKADEKNDRDKGALMARHIDKEIWTQTKLDEVKREEKKVAAAY GKKGRVVLKSGRMADLLAHDMVRLQPATKGSKITGANFOALQVS LAYFKRDILADVFSRAMLTGNGHRHPFLYRIDVSHCSSLRDFYVAYLG ERRKYFEDVAKKIAKNKLNTPCILRRLOREGSGEEAGKDVKPKFLPR GIFTGSIKSCLEKSALNINIRNARNNDVKPAINAAYLILMYEIEKGEFQ GFYGEKRRYDILEEGKPLDLDERKKALASIKPAKIDVSEANMPMSKEE HLMRKRYHAVCNNEAIRMYQVQDILLLLMAKDIFKKALSEGVMSK KIGLENLNGIFDAPVNFVKNFDNIKLATGIIKIDYGVKVCRLGTDFKF NSLVKAFHKVYSKSVEMDYSYDLKEEEFEKYRLNMVKLCREVERGI TEDLHLSLDGKSHLGFNDVVIKPYNDKYNVFNNGDLTFFINARNMF MHGDYKYECVKYVSEHFKGSLNDVSFAKETYGHFENLLESMRKKKT GLRIDI
191	Cas13	MGAIKNKHIFAAAYANLAIDGLIKTLNFIKKLDTQKQLSSWDIKHVIT LIDSIFDQNPQNNLEQVVEGYLPWIKPIIEMKTPKKGERQSDKLCIEY KTITAFASLLNDVRNYYTHYYHDPICIYPGGYDIPSSLNCIYDSAINIK ERFOAEKEMEHLRRYTRKKGRVVLKTEDDHFYYTLANNNDLSEKG YAFFISMFLERKYSYFLKKSFGFRGDSLQYRLTLEVFTALSTKPPVER LRTTKDTKQDRALDILNELSKIPIELYQTLEPKYREMYNETLQPTDAE

		DPYGLPDRSRIRFRSRFEAFALHFLDKQADFKEIGFYTYLGNYFHNGY QKTRVDRETKDRYINFQLAGFCKNIQDISAKKLSEALNVKSIDISTDSI PDINSFEPYLVQSTPHYIVNGNNIGIKVLPEGKDTYPTIDEKGAKMPI ADFWLSKYELPAMLFYTYLRNNNIHKSHCPLSVKDIERSIHKSTKQK HPEERSELMRRVMKAIFWTD SKLNEVERIKSQKSAFGKRQHEILKA GRIAETLVRDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRRND LTEIFTRAGLINSSNPHFLAQIGTNYTSLIEFYIAYLKERKVYFSRIQKK ILQGKLNQCHPLRDLQREPKNPQDKEEAIFLPRGLFNEAIINCLKSKS LKQLIESPTREKSPALNVSYLIQNYFRTYFEDQSQEFYAQPRNYRLFD KLSPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLLEKEDRLYRKN YNEICDNESIIRLYQIQDILLFMMTKEYLPSDLYNRINKYKLENVKGIL NERVSYLIDLNPLKIQGEDIKIDYGKLFYIHHDRISLNVLSKVKRNN NSISSSVKIQPYENYKRECLDFEEAQIPIIHSFEIAMVSMFDPDLKKA TPGNYYDFNELITEYEKRTKQKIGSSFLIKTRNMFLHDKYEAECKEIS DDFVYAKKIIAEFKMKIENIKLEDLSNDSSA
192	Cas13	MGAIENKHIFAAAYANLAIDGLIKTLNFIACKLDTQKQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYYHDPICIYPGGYDIPSSLNCIYDSAINIIE RFQAEKEMEHLRRYTRKKGRVVLKTEDDHFYTLANNNDLSEKGY AFFISMFLERKYSYFLKKLSGFKRGDSLQYRLTLEVFTALSTKPPVERL RTTKDQTKQDRALDILNELSKIPIELYQTLEPKYREMYNETLQPTDAED PYGLPDRSRIRFRSRFEAFALHFLDKQADFKEIGFYTYLGNYFHNGYQ KTRVDRETKDRYINFQLAGFCKNIQDISAKKLSEALNVKSIDISTDSIP DINSFEPYLVQSTPHYIVNGNNIGIKVLPEGKDTYPTIDEKGAKMPIA DFWLSKYELPAMLFYTYLRNNNIHKSHCPLSVKDIERSIHKSTKQKH PEERSELMRRVMKAIFWTD SKLNEVERIKSQKSAFGKRQHEILKAG RIAETLVRDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRRNDL TEIFTRAGLINSSNPHFLAQIGTNYTSLIEFYIAYLKERKVYFSRIQKKI LQGKLNQCHPLRDLQREPKNPQEEAIFLPRGLFNEAIINCLKSKL KHLIESPTREKSPALNVSYLIQNYFRAYFEDQSQEFYAQPRNYRLFDN LSPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLLEKEDRLYRKNY NEICDNESIIRLYQIQDILLFMMTKEYLPSDLYNRINKYKLENVKGILN ERVSYLIDLNPLKIQGEDIKIDYGKLFYIHHDRISLNVLSKVKRNN SISSSVKIQPYENYKRECLDFEEAQIPIIHSFEIAMVSMFDPDLKAT PGNYYDFNELITEYEKRTKQKIDSSFLIKTRNMFLHDKYEAECKEISD DVFYAKKIIAEFKMKIENIKLEDLSNDSSA

193	Cas13	MGAIENKHIFAAAYANLAIDGLIKTLNFI AKKLD TQKQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYYHDPICIYPGGYDIPSSLNCIYDSAINIIE RFQAEKEIEHLRRYTRKKGRVVLKTEDDHFYTLVNNNDLSEKGYA FFISMFLERKYSYFLKKLSGFKRGDSLQYRLTLEVFTALSTKPPVERLR TTKDTKQDRALDILNELSRIPIELYQTLEPKYREMYNETLQPTDAEDP YGLPDRSRIRFRSRFEAFALHFLDKQADFKEIGFYTYLGNYFHNGYQK TRVDRET KDRYINFQLAGFCKNIQDISAKKLSEALNVKSIDISTDSIPDI NSFEPYLVQSTPHYIVNGN NIGIKVLPEGKDTYPTIDEKGAKMPIADF WLSKYELPAMLFYTYLRNNNIHKSHCPLSVKDIIERSIHKSTKQKHPE ERSELM LRRVMKAIFWTD SKLNEVERIKSQKSAFGKRQHEILKAGRI AETLVRDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRRNDLTE IFTRAGLINSSNPHPFLAQIGTNYTSLIEFYIAYLKERKVYFSRIQKKILQ GKLN IQCHPLRDLQREP NKPQDKEEAIFLPRGLFNEAIINCLKSKLK QLIESPTREKSPALNVSYLIQNYFRTYFEDQSQEFYAQPRNYRLFDKL SPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLEKEDRLYRKNY NEICDNESIIRLYQIQDILLFMMTKEYLPDLYNRINKYKLENVKGILN ERVSYLIDLNPLKIQGEDIKIDYGKLFYIHHDTRISLNVLSKVKRNN SISSSVKIOPYENYKRECLDFEEAQIQIPIIHSFEIAMVSMFDPDLKKAT PGNYYDFNELITEYEKRTKQKIDSSFLIKTRNMFLHDKYEAECIKEISD DFVYAKKIIAEFKMKIENIKLEDLSNDSSA
194	Cas13	MGAIENKHIFAAAYANLAIDGLIKTLNFI AKKLD TQKQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYYHDPICIYPGGYDIPSSLNCIYDSAINIIE RFQAEKEMEHLRRYTRKKGRVVLKTEDDHFYTLANNNDLSEKGY AFFISMFLERKYSYFLKKLSGFKRGDSLQYRLTLEVFTALSTKPPVERL RTTKDTKQDRALDILNELSKIPIELYQTLEPKYREMYNETLQPTDAED PYGLPDRSRIRFRSRFEAFALHFLDKQADFKEIGFYTYLGNYFHNGYQ KTRVDRET KDRYINFQLAGFCKNIQDISAKKLSEALNVKSIDISTDSIP DINSFEPYLVQSTPHYIVNGN NIGIKVLPEGKDTYPTIDEKGAKMPIA DFWLSKYELPAMLFYTYLRNNNIHKSHCPLSVKDIIERSIHKSTKQKH PEERSELM LRRVMKAIFWTD SKLNEVERIKSQKSAFGKRQHEILKAG RIAETLVRDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRRNDL TEIFTRAGLINSSNPHPFLAQIGTNYTSLIEFYIAYLKERKVYFSRIQKKI LQGKLN IQCHPLRDLQREP NKPQKEEAIFLPRGLFNEAIINCLKSKL KHLIESPTREKSPALNVSYLIQNYFRAYFEDQSQEFYAQPRNYRLFDN LSPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLEKEDRLYRKNY NEICDNESIIRLYQIQDILLFMMTKEYLPDLYNRINKYKLENVKGILN ERVSYLIDLNPLKIQGEDIKIDYGKLFYIHHDTRISLNVLSKVKRNN SISSSVKIOPYENYKRECLDFEEAQIQIPIIHSFEIAMVSMFDPDLKKAT

		PGNYYDFNELITEYEKRTKQKIDSSFLIKTRNMFLHDKYEAECEIKESD DFVYAKKIIAEFKMKIENIKLEDFSNDSSA
195	Cas13	MGAIENKHIFAAAYANLAIDGLIKTLNFIKKLDTQKQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYYHDPICIYPGGYDIPSSLNCIYDSAINIIE RFQAEKEMEHLRRYTRKKGRVVLKTEDDHFYTLANNNDLSEKGY AFFISMFLERKYSYFLKKLSGFKRGDSLQYRLTLEVFTALSTKPPVERL RTTKDTKQDRALDILNELSKIPIELYQTLEPKYREMYNETLQPTDAED PYGLPDRSRIRFRSRFETFALHFLDKQPDFKEIGFYTYLGNFYHNGYQ KTRVDRETCDRYINFQLAGFCKNIQDISAKKLSEALNVKSIDISTDSIP DINSFEPYLVQSMPHYIVNGNIGIKVLPEGKDTYPTIDEKGAKMPI ADFWLSKYELPAMLFYTYLRNNNIHKSHCPLSVKDIIERSIHKSTKQK HPEERSELMRRVMKAIFWTD SKLNEVERIKSQKSAFGKRQHEILKA GRIAEMLRDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRRNDL TEIFTRAGLINSSNPHFLAQIGTNYTSLIEFYIAYLKERKVYFSRIQK KILQGKLNQCHPLRDLQREPNKPQEKEAIFLPRGLFNEAIINCLKKS KLKQLIESPTREKSPALNVSYLIQNYFRAYFEDQSQEFYAQPRNYRLF DKLSPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLLEKEDRLYRK NYNEICDNESIIRLYQIQDILLFMMTKEYLPSDLYNRINKYKLENVKGI LNERVSYLIDLNPLKIQGEDIKIKDYGKLFYIHHDRISLKNVLSKVKR NNSISSSVKIQPYENYKRECLDFEEAQIPIIHSFEIAMVSMFPDLKK ATPGNYYDFNELITEYEKRTKQKIDSSFLIKTRNMFLHDKYEAECEIKES DDFVYAKKIIAEFKMKIENIKLEDLSNDSSA
196	Cas13	MGAIENKHIFAAAYANLAIDGLIKTLNFIKKLDTQKQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYYHDPICIYPRGYDIPSSLNCIYDSAINIIE RFQAEKEMEHLRNYTLVNNNGLSEKGYAFFISKFLERKYSYFLKKL SGFKRGDSLQYRLTLEVFTALSTKPPVERLRTTKDTKQDRALDILNELS RIPIELYQTLEPKYREMYNETLQPTDAEDPYGLPDRSRIRFRSRFEAFA LHFLDKQADFKEIGFYTYLGNFYHNGYQKTRVDRETCDRYINFQLAG FCKNIQDISAKKLSEALNVKSIDISTDSIPDINSFEPYLVQSTPHYIVNG NNIGIKVLPEGKDTYPTIDEKGAKMPIADFWLSKYELPAMLFYTYLR NNNIHKSHCPLSVKDIIERSIHKSTKQKHPEERSELMRRVMKAIFWT DSKLNEVERIKSQKSAFGKRQHEILKAGRIAETLRDMLWLQPSKNN GRDKVTEPNFQAIQVSLAYFGIRRNDLTEIFTRAGLINSSNPHFLAQ IGTNYTSLIEFYIAYLKERKVYFSRIQKILQGKLNQCHPLRDLQREPN KPQEKEAIFLPRGLFNEAIINCLKSKLHLIESPTREKSPALNVSYLIH

		NYFRAYFEDQSQEFYAQPRNYRLFDKLSPNKGKSKSYLSLEQRIKKM EELRPSKIPVAEANKLLEKEDRLYRKNYNEICDNESIIRLYQIQDILLFM MTKEYLPSDLYNRINKYKLENVKGILNERVSYLIDLNPLKIQGEDIKIK DYGKLFYIHHDTRISSLNKVLSKVKRNNSSSSSVKIQPYENYKRECLDF EEAQIQIPIIHSFEIAMVSMFDPDLKKATPGNYYDFNELITEYEKRTKQ KIDSSFLIKTRNMFLHDKYEAECIKEISDDFVYAKKIIAEFKMKIENIKLE DLSNDSSA
197	Cas13	MGAIENKHIFAAAYANLAIDGLIKTLNFIKKLDTQKQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYYHDPICIYPGGYDIPSSLNCIYDSAINIIE RFQAEKEIEHLRRYTRKKGRVVLKTEDDHFYTLVNNNDLSEKGYA FFISMFLERKYSYFLKKLSGFKRGDSLQYRLTLEVFTALSTKPPVERLR TTKDTKQDRALDILNELSRPIELYQTLEPKYREMYNETLQPTDAEDP YGLPDRSRIRFRSRFEAFALHFLDKQADFKEIGFYTYLGNYFHNGYQK TRVDRETCDRYINFQLAGFCKNIQDISAKKLEALNVKSIDISTDSIPDI NSFEPYLVQSTPHYIVNGNNGIKVLPEGKDTYPTIDEKGAKMPIADF WLSKYELPAMLFYTYLRNNNIHSHCPLSVKDIIERSIHKSTKQKHPE ERSELMRLRMKAIFWTDKSLNEVERIKSQKSAFGKRQHEILKAGRI AETLVRDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRRNDLTE IFTRAGLINSSNPHFPLAQIGTNYTSLIEFYIAYLKERKVYFSRIQKKILQ GKLNIQCHPLRDLQREPKNPQDKEEAIPLRGLFNEAIINCLKSKLK QLIESPTREKSPALNVSYLIQNYFRTYFEDQSQEFYAQPRNYRLFDKL SPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLLEKEDRLYRKNY NEICDNESIIRLYQIQDILLFMMTKEYLPSDLYNRINKYKLENVKGILN ERVSYLIDLNPLKIQGEDIKIKDYGKLFYIHHDTRISSLNKVLSKVKRNN SSSSVKIQPYENYKRECLDFEEAQIQIPIIHSFEIAMVSMFDPDLKKAT PGNYYDFNELITEYEKRTKQKIDSSFLIKTRNMFLHDKYEAECIKEISD DFVYAKKIIAEFKMKIENIKLEDLSNDSSA
198	Cas13	MGAIENKHIFAAAYANLAIDGLIKTLNFIKKLDTQKQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYYHDPICIYPGGYDIPSSLNCIYDSAINIIE RFQAEKEMEHLRRYTRKKGRVVLKTEDDHFYTLANNNDLSEKGY AFFISMFLERKYSYFLKKLSGFKRGDSLQYRLTLEVFTALSTKPPVERL RTTKDTKQDRALDILNELSRPIELYQTLEPKYREMYNETLQPTDAED PYGLPDRSRIRFRSRFEAFALHFLDKQADFKEIGFYTYLGNYFHNGYQ KTRVDRETCDRYINFQLAGFCKNIQDISAKKLEALNVKSIDISTDSIP DINSFEPYLVQSTPHYIVNGNNGIKVLPEGKDTYPTIDEKGAKMPIA

		DFWLSKYELPAMLFYTYLRNNNIHKSCHPLSVKDIERSIHKSTKQKH PEERSELMRRVMKAIFWTD SKLNEVERIKSQKSAFGKRQHEILKAG RIAETLVRDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRRNDL TEIFTRAGLINSSNPHFLAQIGTNYTSLIEFYIAYLKERKVYFSRIQKKI LQGKLNQCHPLRDLQREPKNPQKEKEAIFLPRGLFNEAIINCLKSKL KQLIESPTREKSPALNVSYLILNYFRTYFEDQSQEFYAQPRNYRLFDKL SPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLLEKEDRLYRKNY NEICDNESIIRLYQIQDILLFMMTKEYLPSDLYNRINKYKLENVKGILN ERVSYLIDLNLPLKIQGEDIKIKDYGKLFYIHHDTRINSLNKVLSKVKRNN NSISSSVKIQPYENYKRECLDFEEAQIPIIHSFEIAMVSMFDPDLKKA TPGNYYDFNELITEYEKRTKQKIDSSFLIKTRNMFLHDKYEAECKEIS DDFVYAKKIIAEFKMKIENIKLEDFSNDSSA
199	Cas13	MGAIENKHIFAAYANLAIDGLIKTLNFIKKLDTQKQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYYHDPICIYPGGYDIPSSLNCIYDSAINIIE RFQAEKEMEHLRRYTRKKGRVVLKTEDDHFYTLANNNDLSEKGY AFFISMFLERKYSYFLKKSFGKRGDSLQYRLTLEVFTALSTKPPVERL RTTKDQTKDRALDILNELSKIPIELYQTLEPKYREMYNETLQPTDAED PYGLPDRSRIRFSRFEAFALHFLDKQADFKEIGFYTYLGNFYHNGYQ KTRVDRETKDRYINFQLAGFCKNIQDISAKKLEALNVKSIDISTDISP DINSFEPYLVQSTPHYIVNGNIGIKVLPBGKDTYPTIDEKGAKMPIA DFWLSKYELPAMLFYTYLRNNNIHKSCHPLSVKDIERSIHKSTKQKH PEERSELMRRVMKAIFWTD SKLNEVERIKSQKSAFGKRQHEILKAG RIAETLVRDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRRNDL TEIFTRAGLINSSNPHFLAQIGTNYTSLIEFYIAYLKERKVYFSRIQKKI LQGKLNQCHPLRDLQREPKNPQKEKEAIFLPRGLFNEAIINCLKSKL KHLIESPTREKSPALNVSYLIQNYFRAYFEDQSQEFYAQPRNYRLFDK LSPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLLEKEDRLYRKNY NEICDNESIIRLYQIQDILLFMMTKEYLPSDLYNRINKYKLENVKGILN ERVSYLIDLNLPLKIQGEDIKIKDYGKLFYIHHDTRISLNVLSKVKRNN SISSSVKIQPYENYKRECLDFEEAQIPIIHSFEIAMVSMFDPDLKAT PGNYYDFNELITEYEKRTKQKIDSSFLIKTRNMFLHDKYEAECKEISD DFVYAKKIIAEFKMKIENIKLEDLSNDSSA
200	Cas13	MGAIENKHIFAAYANLAIDGLIKTLNFIKKLDTQKQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYYHDPICIYPGGYDIPSSLNCIYDSAINIIE RFQAEKEMEHLRRYTRKKGRVVLKTEDDHFYTLANNNDLSKKGY

		AFFISMFLERKYSYFLKKLSGFKRGDSLQYRLTLEVFTALSTKPPVERL RTTKDTKQDRALDILNELSRPIELYQTLEPKYREMYNETLQPTDAED PYGLPDRSRIRFRSRFEAFALHFLDKQADFKEIGFYTYLGNYFHNGYQ KTRVDRETKDRYINFQLAGFCKNIQDISAKKLSEALNVKSIDISTDSIP DINSEFYPYLVQSTPHYIVNGNNIGIKVLPEGKDTYPTIDEKGAKMPIA DFWLSKYELPAMLFYTYLRNNNIHKSHCPLSVKDIIERSIHKSTKQKH PEERSELMRRVMKAIFWTD SKLNEVERIKSQKSAFGKRQHEILKAG RIAETLVRDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRRNDL TEIFTRAGLINSSNPHFLAQIGTNYTSLIEFYIAYLKERKVYFSRIQKKI LQGKLNQCHPLRDLQREPKNPQKEEAFIPLRGLFNEAIINCLKSKL KQLIESPTREKSPALNVSYLILNYFRTYFEDQSQEFYAQPRNYRFLDKL SPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLEKEDRLYRKNY NEICDNESIIRLYQIQDILLFMMTKEYLPDLYNRINKYKLENVKGILN ERVSYLIDLNLPLKIQGEDIKIDYGKLFYIHHDRINSLNKVLSKVVRN NSISSSVKIQPYENYKRECLDFEEAQIIPIIHSFEIAMVSMFPDLKKA TPGNYYDFNELITEYEKRTKQKIDSSFLIKTRNMFHDKYEAECKEIS DDFVYAKKIIAEFKMKIENIKLEDFSNDSA
201	Cas13	MKHVFAAYFSDARLNIMASLNDVREKSGLKRYKNEAENVQNFEGIF PKNIASDIRDKRITLLRIRFPFIETIVDPGRGKENPASKYGELSWLFQLV NDMRNVFIHSTGSEEEIDYQHKKIFNALRKVYDCGLRTVKSRLFQLE NDTTmplLRCDNRGRPKPFNKFSALCTSPERNGNKKQSDVLHDFG RVLLCSLFLEKRQISGLVSHFWDKNGYGTWDNDSEQTIIRELLYNRI RLPSQRLRTDSTLTSVTLDTISELARCPRLFELLDADGQENFRVGRS PKNPQNRNDPSYLLLRGHQSRFIPLAMRHLD FDSKCKLRFVAVDLG QYYHSVRLKPAESFIDGNPGIRRLGQKIIAFGRKDFEDAEPKPEIWKK LEENGQKFAEEEEELLKRASITGSPEELKPYIIKTFPHYHLYRDKIGFCID WEEKKDQKVYPNLGVRGEDSKSTDSGGIKKRENRLSRHQFWISP NKIIDLAFYHYLQTEIKQEITASVKTGRKKCPYPSVENILKEYYEGMVV LIKELKEQGPLPPWTEIPQISERRAECHRWINKEIIKAENFTISLADLPK AIRRHLLKVLDSRETSVSDIIRTKTMIEETCKKQKEIEYLLKYPKRGKK GFRPIKHGNIADFLTEDLLRFQPKDSSKKNNGGLTSKNYQILQKAIAY YDKPYCIVDLLKKSGLLEGEFKHPFLCKIITEENHEQYSTLIDFYQKYLE ERKAFLEGFIDTFVAGSSIPGWLRLRPSTFESWLDQQLDEDEKLQ PLPVPKSLFYQMLLKMTAEKLDLTPEMLCKKGTQRFIRDSQEVEVKP SVSWFIRQYMEHRDDTAQEMYMFKRRHELDFDFHDKKKTTKKLHE EKTCLSEKVRQEELESVHKGIEKLKLLRTYKRSEKKIRHFSTMDMV LYLLAKKNFEKLILCDETS GPDWSLKTLETKILSTKIKYELNVP GTDRTI VHRACAIKKTGELRLLVRDRRLPSLLDYYPKTEKSIDQEEIKVELADYS CKRIEAMKLISDLEQKIEESCNRGFCKPVPDKLKKIFGAKKHGTLLYAL

		YHRFHEEKDSVDEQGFNKDCFAHARQIRNAFAHNEYVPVSEQFNQI VRQVNETSQPHNHNSPVNHPKIDQLVKELDKLYKPWRNFLKRIAG
202	Cas13	MGAIENKHIFAAAYANLAIDGLIKTLNFIKKLDTQKQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYYHDPICYPGRYDIPSSLNCIYDSAINIIE RFQAEKEMEHLRNYTLVNNNGLSEKGYAFFISKFLERKYSYFLKKL SGFKRGDSLQYRLTLEVFTALSTKPPVERLRTTKDTKQDRALDILNELS RIPIELYQTLEPKYREMYNETLQPTDAEDPYGLPDRSRIRFRSRFEAFA LHFLDKQADFKEIGFYTYLGNYFHNGYQKTRVDRETCDRYINFQLAG FCKNIQDISAKKLSEALNVKSIDISTDSIPDINSFEPYLVQSTPHYIVNG NNIGIKVLPEGKDTYPTIDEKGAKMPIADFWLSKYELPAMLFYTYLR NNNIHKSHCPLSVKDIIERSIHKSTKQKHPEERSELMRLRRVMKAIFWT DSKLNEVERIKSQSAFGKRQHEILKAGRIAETLVRDMLWLQPSKNN GRDKVTEPNFQAIQVSLAYFGIRRNDLTEIFTRAGLINSSNPHFLAQ IGTNYTSLIEFYIAYLKERKVYFSRIQKKILQGKLNQCHPLRDLQREP KPQEKEEAIFLPRGLFNEAIINCLKSKLKHIESPTREKSPALNVSYLIH NYFRAYFEDQSQEFYAQPRNYRLFDKLSPNKGKSKSYLSLEQRIKKM EELRPSKIPVAEANKLLEKEDRLYRKNYNEICDNESIIRLYQIQDILLFM MTKEYLPDLYNRINKYKLENVKGILNERVSYLIDLNPLKIQGEDIKIK DYGKLFYIHHDTRISLNVLSKVKNNSISSSVKIQPYENYKRECLDF EEAQIQIPIIHSFEIAMVSMFDPDLKKATPGNYYDFNELITEYEKRTKQ KIDSSFLIKTRNMFHDKYEAECIKEISDDFVYAKKIIAEFKMKIENIKLE DLSNDSSA
203	Cas13	MGAIENKHIFAAAYANLAIDGLIKTLNFIKKLDTQKQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYYHDPICYPGRYDIPSSLNCIYDSAINIIE RFQAEKEMEHLRNYTLVNNNGLSEKGYAFFISKFLERKYSYFLKKL SGFKRGDSLQYRLTLEVFTALSTKPPVERLRTTKDTKQDRALDILNELS RIPIELYQTLEPKYREMYNETLQPTDAEDPYGLPDRSRIRFRSRFEAFA LHFLDKQADFKEIGFYTYLGNYFHNGYQKTRVDRETCDRYINFQLAG FCKNIQDISAKKLSEALNVKSIDISTDSIPDINSFEPYLVQSTPHYIVNG NNIGIKVLPEGKDTYPTIDEKGAKMPIADFWLSKYELPAMLFYTYLR NNNIHKSHCPLSVKDIIERSIHKSTKQKHPEERSELMRLRRVMKAIFWT DSKLNEVERIKSQSAFGKRQHEILKAGRIAETLVRDMLWLQPSKNN GRDKVTEPNFQAIQVSLAYFGIRRNDLTEIFTRAGLINSSNPHFLAQ IGTNYTSLIEFYIAYLKERKVYFSRIQKKILQGKLNQCHPLRDLQREP KPQEKEEAIFLPRGLFNEAIINCLKSKLKHIESPTREKSPALNVSYLIH NYFRAYFEDQSQEFYAQPRNYRLFDKLSPNKGKSKSYLSLEQRIKKM EELRPSKIPVAEANKLLEKEDRLYRKNYNEICDNESIIRLYQIQDILLFM

		MTKEYLPSDLYNRINKYKLENVKGILNERVSYLIDLNPLKIQGEDIKIK DYGKLFYIHHDTRISSLNKVLSKVKRNNSSSSVKIQPYENYKRECLDF EEAQIQIPIIHSFEIAMVSMFDPDLKKATPGNYYDFNELITEYEKRTKQ KIDSSFLIKTRNMFLHDKYEAECIKEISDDFVYAKKIIAEFKMKIENIKLE DLSNDSSA
204	Cas13	MGAIENKHIFAAAYANLAIDGLIKTLNFIKKLDTQKQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYYHDPICIYPGGYDIPSSLNCIYDSAINIIE RFQAEKEMEHLRRYTRKKGRVVLKTEDDHFYTLANNNDLSEKGY AFFISMFLERKYSYFLKKLSGFKRGDSLQYRLTLEVFTALSTKPPVERL RTTKDTKQDRALDILNELSKIPIELYQTLEPKYREMYNETLQPTDAED PYGLPDRSRIRFRSRFEAFALHFLDKQADFKEIGFYTYLGNYPFHNGYQ KTRVDRETCDRYINFQLAGFCKNIQDISAKKLEALNVKSIDISTDSIP DINSFEPYLVQSTPHYIVNGNIGIKVLPEGKDTYPTIDEKGAKMPIA DFWLSKYELPAMLFYTYLRNNNIHKSHCPLSVKDIIERSIHKSTKQKH PEERSELMRRVMKAIFWTDSKLNEVERIKSQSAFGKRQHEILKAG RIAETLVRDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRRNDL TEIFTRAGLINSSNPHFLAQIGTNYTSLIEFYIAYLKERKVYSRIQKKI LQGLNIQCHPLRDLQREPKNPQEEAIFLPRGLFNEAIINCLKSKL KHLIESPTREKSPALNVSYLIQNYFRAYFEDQSQEFYAQPRNYRFLDN LSPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLEKEDRLYRKNY NEICDNESIIRLYQIQDILLFMMTKEYLPSDLYNRINKYKLENVKGILN ERVSYLIDLNPLKIQGEDIKIKDYGKLFYIHHDTRISSLNKVLSKVKRNN SSSSVKIQPYENYKRECLDFEEAQIQIPIIHSFEIAMVSMFDPDLKKAT PGNYYDFNELITEYEKRTKQKIDSSFLIKTRNMFLHDKYEAECIKEISD DFVYAKKIIAEFKMKIENIKLEDFSNDSSA
205	Cas13	MGAIENKHIFAAAYANLAIDGLIKTLNFIKKLDTQKQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYYHDPICIYPRGYDIPSSLNCIYDSAINIIE RFQAEKEMEHLRNYTLVNNNGLSEKGYAFFISKFLERKYSYFLKKL SGFKRGDSLQYRLTLEVFTALSTKPPVERLRTTKDTKQDRALDILNELS RIPIELYQTLEPKYREMYNETLQPTDAEDPYGLPDRSRIRFRSRFEAFAL HFLDKQADFKEIGFYTYLGNYPFHNGYQKTRVDRETCDRYINFQLAG FCKNIQDISAKKLEALNVKSIDISTDSIPDINSFEPYLVQSTPHYIVNG NIGIKVLPEGKDTYPTIDEKGAKMPIADFWLSKYELPAMLFYTYLR NNNIHKSHCPLSVKDIIERSIHKSTKQKHPEERSELMRRVMKAIFWT DSKLNEVERIKSQSAFGKRQHEILKAGRIAETLVRDMLWLQPSKNN

		GRDKVTEPNFQAIQVSLAYFGIRRNDLTEIFTRAGLINSSNPHFLAQ IGTNYTSLIEFYIAYLKERKVYFSRIQKKILQGKLNIQCHPLRDLQREP KPQEKEEAIFLPRGLFNEAIINCLKKSKLKHIESPTREKSPALNVSYLIH NYFRAYFEDQSQEFYAQPRNYRFLDKLSPNKGKSKSYLSLEQRIKKM EELRPSKIPVAEANKLLEKEDRLYRKNYNEICDNESIIRLYQIQDILLFM MTKEYLPSDLYNRINKYKLENVKGILNERVSYLIDLNPLKIQGEDIKIK DYGKLFYIHHDRISLKNVLSKVKRNNSSSSVKIQPYENYKRECLDF EEAQIQIPIIHSFEIAMVSMFPDLKKATPGNYYDFNELITEYEKRTKQ KIDSSFLIKTRNMFLHDKYEAECIKEISDDFVYAKKIIAEFKMKIENIKLE DLSNDSSA
206	Cas13	MGAIKNKHIFAAAYANLAIDGLIKTLNFIKKLDTQKQLSSWDIKHVIT LIDSIFDQNPQNNLEQVVEGYLPWIKPIEMKTPKKGERQSDKLCIEY KTIITAFASLLNDVRNYYTHYYHDPICIYPPGGYDIPSSLNCIYDSAINIK ERFQAEKEMEHLRRYTRKKGRVVLKTEDDHFYTLANNNDLSEK YAFFISMFLERKYSYFLKKLSGFKRGDSLQYRLTLEVFTALSTKPPVER LRTTKDTKQDRALDILNELSKIPIELYQTLEPKYREMYNETLQPTDAE DPYGLPDRSRIRFRSRFEAFALHFLDKQADFKEIGFYTYLGNYFHNGY QKTRVDRETCDRYINFQLAGFCKNIQDISAKKLSEALNVKSIDISTDSI PDINSFEPYLVQSTPHYIVNGNIGIKVLPEGKDTYPTIDEKGAKMPI ADFWLSKYELPAMLFYTYLRNNNIHKSHCPLSVKDIERSIHKSTKQK HPEERSELMRRVMKAIFWTD SKLNEVERIKSQSAFGKRQHEILKA GRIAETLVRDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRRND LTEIFTRAGLINSSNPHFLAQIGTNYTSLIEFYIAYLKERKVYFSRIQKK ILQGKLNQCHPLRDLQREPKNPQDKEEAIFLPRGLFNEAIINCLKKSK LKQLIESPTREKSPALNVSYLIQNYFRTYFEDQSQEFYAQPRNYRFLD KLSPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLLEKEDRLYRKN YNEICDNESIIRLYQIQDILLFMMTKEYLPSDLYNRINKYKLENVKGIL NERVSYLIDLNPLKIQGEDIKIKDYGKLFYIHHDRISLKNVLSKVKRNN NSISSSVKIQPYENYKRECLDFEEAQIQIPIIHSFEIAMVSMFPDLKKA TPGNYYDFNELITEYEKRTKQKIGSSFLIKTRNMFLHDKYEAECIKEIS DDFVYAKKIIAEFKMKIENIKLEDLSNDSSA
207	Cas13	MGAIVENKHIFAAAYANLAIDGLIKTLNFIKKLDTQKQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYYHDPICIYPPGGYDIPSSLNCIYDSAINIIE RFQAEKEMEHLRRYTRKKGRVVLKTEDDHFYTLANNNDLSKKG YAFFISMFLERKYSYFLKKLSGFKRGDSLQYRLTLEVFTALSTKPPVERL RTTKDTKQDRALDILNELSRIPIELYQTLEPKYREMYNETLQPTDAED

		PYGLPDRSRIRFRSRFEAFALHFLDKQADFKEIGFYTYLGNYFHNGYQ KTRVDRETKDRYINFQLAGFCKNIQDISAKKLSEALNVKSIDISTDSIP DINSEFEPYLVQSTPHYIVNGNNIGIKVLPEGKDTYPTIDEKGAKMPIA DFWLSKYELPAMLFYTYLRNNNIHKSHCPLSVKDIIERSIHKSTKQKH PEERSELMRRVMKAIFWTDSKLNEVERIKSQSAFGKRQHEILKAG RIAETLVRDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRRNDL TEIFTRAGLINSSNPHFLAQIGTNYTSLIEFYIAYLKERKVYFSRIQKKI LQGKLNQCHPLRDLQREPKNPQKEEEAIFLPRGLFNEAIINCLKSKL KQLIESPTREKSPALNVSYLILNYFRTYFEDQSQEFYAQPRNYRFLDKL SPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLLEKEDRLYRKNY NEICDNESIIRLYQIQDILLFMMTKEYLPSDLYNRINKYKLENVKGILN ERVSYLIDLNPLKIQGEDIKIKDYGKLFYIHHDRINSLNKVLSKVVRN NSISSSVKIQPYENYKRECLDFEEAQIIPIIHSFEIAMVSMFDPDLKKA TPGNYYDFNELITEYEKRTKQKIDSSFLIKTRNMFLHDKYEAECIKEIS DDFVYAKKIIAEFKMKIENIKLEDFSNDSSA
208	Cas13	MGAIENKHIFAAYANLAIDGLIKTLNFIKKLDTQKQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYYHDPICIYPGGYDIPSSLNCIYDSAINIIE RFQAEEMKHLRNYTLVNNNGLSEKGYAFFISKFLERKYSYFLKKL SGFKRGDSLQYRLTLEVFTALSTKPPVERLRTTKDTKQDRALDILNELS KIPIELYQTLEPKYREMYNETLQPTDAEDPYGLPDRSRIRFRSRFEAFA LHFLDKQADFKEIGFYTYLGNYFHNGYQKTRVDRETKDRYINFQLAG FCKNIQDISAKKLSEALNVKSIDISTDSIPDINSEFEPYLVQSTPHYIVNG NNIGIKVLPEGKDTYPTIDEKGAKMPIADFWLSKYELPAMLFYTYLR NNNIHKSHCPLSVKDIIERSIHKSTKQKHPEERSELMRRVMKAIFWT DSKLNEVERIKSQSAFGKRQHEILKAGRIETLVRDMLWLQPSKNN GRDKVTEPNFQAIQVSLAYFGIRRNDLTEIFTRAGLINSSNPHFLAQ IGTNYTSLIEFYIAYLKERKVYFSRIQKKILQGKLNQCHPLRDLQREP NKPQKEEEAIFLPRGLFNEAIINCLKSKLQQLIESPTREKSPALNVSYLIQ NYFRTYFEDQSQEFYAQPRNYRFLDKLSPNKGKSKSYLSLEQRIKKM EELRPSKIPVAEANKLLEKEDRLYRKNYNEICDNESIIRLYQIQDILLFM MTKEYLPSDLYNRINKYKLENVKGILNERVSYLIDLNPLKIQGEDIKIK DYGKLFYIHHDRINSLNKVLSKVVRNNSISSSVKIQPYENYKRECLDF EEAQIIPIIHSFEIAMVSMFDPDLKATPGNYYDFNELITEYEKRTKQ KIDSSFLIKTRNMFLHDKYEAECIKEISDDL VYAKKIIAEFKMKIENIKLE DLSNDSSA

209	Cas13	MGAIKNKHFAAYANLAIDGLIKTLNFI AKKLD TQKQLSSWDIKHVIT LIDSIFDQNPQNNLEQVVEGYLPWIKPIIEMKTPKKGERQSDKLCIEY KIITAFASLLNDVRNYYTHYYHDPICIYPGGYDIPSSLNCIYDSAINIIK ERFQAEKEMEHLRRYTRKKGRVVLKTEDDHFYITLANNNDLSEKG YAFFISMFLERKYSYFLKKLSGFKRGDSLQYRLTLEVFTALSTKPPVER LRTTKDTKQDRALDILNELSKIPIELYQTLEPKYREMYNETLQPTDAE DPYGLPDRSRIRFRSRFEAFALHFLDKQADFKEIGFYTYLGNYFHNGY QKTRVDRET KDRYINFQLAGFCKNIQDISAKKLSEALNVKSIDISTDSI PDINSFEPYLVQSTPHYIVNGNNIGIKVLPEGKDTYPTIDEKGAKMPI ADFWLSKYELPAMLFYTYLRNNNIHKSHCPLSVKDIERSIHKSTKQK HPEERSELMRRVMKAIFWTD SKLNEVERIKSQSAFGKRQHEILKA GRI AETLVRDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRRND LTEIFTRAGLINSSNPHFLAQIGTNYTSLIEFYIAYLKERKVYFSRIQKK ILQGKLN IQCHPLRDLQREP NKPQDKEEAIFLPRGLFNEAIINCLKSK LKQLIESPTREKSPALNVSYLIQNYFRTYFEDQSQEFYAQPRNYRLFD KLSPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLLEKEDRLYRKN YNEICDNESIIRLYQIQDILLFMMTKEYLPDLYNRINKYKLENVKGIL NERVSYLIDLNPLKIQGEDIKIKDYGKLFYIHHDTRISLNKVL SKVKRN NSISSSVKIQPYENYKRECLDFEEAQI IPIIHSFEIAMVSMFDPDLKKA TPGNYYDFNELITEYEKRTKQKIGSSFLIKTRNMFLHDKYEAECIKEIS DDFVYAKKIIAEFKMKIENIKLEDLSNDSSA
210	Cas13	MGAIENKHFAAYANLAIDGLIKTLNFI AKKLD TQKQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYYHDPICIYPGGYDIPSSLNCIYDSAINIIKE RFQAEKEMEHLRRYTRKKGRVVLKTEDDHFYITLANNNDLSEKGY AFFISMFLERKYSYFLKKLSGFKRGDSLQYRLTLEVFTALSTKPPVERL RTTKDTKQDRALDILNELSRIPIELYQTLEPKYREMYNETLQPTDAED PYGLPDRSRIRFRSRFEAFALHFLDKQADFKEIGFYTYLGNYFHNGYQ KTRVDRET KDRYINFQLAGFCKNIQDISAKKLSEALNVKSIDISTDSIP DINSFEPYLVQSTPHYIVNGNNIGIKVLPEGKDTYPTIDEKGAKMPIA DFWLSKYELPAMLFYTYLRNNNIHKSHCPLSVKDIERSIHKSTKQKH PEERSELMRRVMKAIFWTD SKLNEVERIKSQSAFGKRQHEILKAG RIAETLVRDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRRNDL TEIFTRAGLINSSNPHFLAQIGTNYTSLIEFYIAYLKERKVYFSRIQKKI LQGKLN IQCHPLRDLQREP NKPQEKEEAIFLPRGLFNEAIINCLKSKL KQLIESPTREKSPALNVSYLILNYFRTYFEDQSQEFYAQPRNYRLFDKL SPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLLEKEDRLYRKNY NEICDNESIIRLYQIQDILLFMMTKEYLPDLYNRINKYKLENVKGILN ERVSYLIDLNPLKIQGEDIKIKDYGKLFYIHHDTRINSLNKVLSVKVRN NSISSSVKIQPYENYKRECLDFEEAQI IPIIHSFEIAMVSMFDPDLKKA

		TPGNYDFNELITEYEKRTKQKIDSSFLIKTRNMFHDKYEAEICKEIS DDFVYAKKIIAEFKMKIENIKLEDFSNDSSA
211	Cas13	MGAIENKHIFAAAYANLAIDGLIKTLNFIKKLDTQKQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYYHDPICIYPGGYDIPSSLNCIYDSAINIIKE RFQAEKEMEHLRRYTRKKGRVVLKTEDDHFYTLANNNDLSEKGY AFFISMFLERKYSYFLKKLSGFKRGDSLQYRLTLEVFTALSTKPPVERL RTTKDTKQDRALDILNELSKIPIELYQTLEPKYREMYNETLQPTDAED PYGLPDRSRIRFRSRFEAFALHFLDKQADFKEIGFYTYLGNYFHNGYQ KTRVDRETKDRYINFQLAGFCKNIQDISAKKLSEALNVKSIDISTDSIP DINSFEPYLVQSTPHYIVNGNIGIKVLPEGKDTYPTIDEKGAKMPIA DFWLSKYELPAMLFYTYLRNNNIHKSHCPLSVKDIIERSIHKSTKQKH PEERSELMRRVMKAIFWTDSKLNEVERIKSQKSAFGKRQHEILKAG RIAETLVRDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRRNDL TEIFTRAGLINSSNPHFLAQIGTNYTSLIEFYIAYLKERKVYFSRIQKKI LQGKLNQCHPLRDLQREPKNPQKEEAIPLPRGLFNEAIINCLKSKL KHLIESPTREKSPALNVSYLIQNYFRAYFEDQSQEFYAQPRNYRFLDN LSPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLLEKEDRLYRKNY NEICDNESIIRLYQIQDILLFMMTKEYLPSDLYNRINKYKLENVKGILN ERVSYLIDLNPLKIQGEDIKIDYGKLFYIHHDRISLNVLSKVKRNN SISSSVKIQPYENYKRECLDFEEAQIPIIHSFEIAMVSMFPDLKAT PGNYYDFNELITEYEKRTKQKIDSSFLIKTRNMFHDKYEAEICKEISD DFVYAKKIIAEFKMKIENIKLEDFSNDSSA
212	Cas13	MGAIENKHIFAAAYANLAIDGLIKTLNFIKKLDTQKQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYYHDPICIYPRGYDIPSSLNCIYDSAINIIKE RFQAEKEMEHLRNYTLVNNNGLSEKGYAFFISKFLERKYSYFLKKL SGFKRGDSLQYRLTLEVFTALSTKPPVERLRTTKDTKQDRALDILNELS RIPIELYQTLEPKYREMYNETLQPTDAEDPYGLPDRSRIRFRSRFEAFAL HFLDKQADFKEIGFYTYLGNYFHNGYQKTRVDRETKDRYINFQLAG FCKNIQDISAKKLSEALNVKSIDISTDSIPDINSFEPYLVQSTPHYIVNG NNIGIKVLPEGKDTYPTIDEKGAKMPIADFWLSKYELPAMLFYTYLR NNNIHKSHCPLSVKDIIERSIHKSTKQKHPEERSELMRRVMKAIFWT DSKLNEVERIKSQKSAFGKRQHEILKAGRIAETLVRDMLWLQPSKNN GRDKVTEPNFQAIQVSLAYFGIRRNDLTEIFTRAGLINSSNPHFLAQ IGTNYTSLIEFYIAYLKERKVYFSRIQKKILQGKLNQCHPLRDLQREP KPQKEEAIPLPRGLFNEAIINCLKSKLKHIESPTREKSPALNVSYLIH NYFRAYFEDQSQEFYAQPRNYRFLDKLSPNKGKSKSYLSLEQRIKKM EELRPSKIPVAEANKLLEKEDRLYRKNYNEICDNESIIRLYQIQDILLFM

		MTKEYLPSDLYNRINKYKLENVKGILNERVSYLIDLNPLKIQGEDIKIK DYGKLFYIHHDTRISSLNKVLSKVKRNNSSISSVKIQPYENYKRECLDF EEAQIQIPIIHSFEIAMVSMFDPDLKKATPGNYYDFNELITEYEKRTKQ KIDSSFLIKTRNMFLHDKYEAECIKEISDDFVYAKKIIAEFKMKIENIKLE DLSNDSSA
213	Cas13	MGAIENKHIFAAAYANLAIDGLIKTLNFIAKKLDQKQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYYHDPICIYPGGYDIPSSLNCIYDSAINIIE RFQAEKEMEHLRRYTRKKGRVVLKTEDDHFYTLANNNDLSEKGY AFFISMFLERKYSYFLKKLSGFKRGDSLQYRLTLEVFTALSTKPPVERL RTTKDTKQDRALDILNELSRIPIELYQTLEPKYREMYNATLQPTDAED PYGLPDRSRIRFRSRFEAFALHFLDKQADFKEIGFYTYLGNYPFHNGYQ KTRVDRETCDRYINFQLAGFCKNIQDISAKKLEALNVKSIDISTDSIP DINSFEPYLVQSTPHYIVNGNIGIKVLPEGKDTYPTIDEKGAKMPIA DFWLSKYELPAMLFYTYLRNNNIHKSHCPLSVKDIIERSIHKSTKQKH PEERSELMRRVMKAIFWTD SKLNEVERIKSQSAFGKRQHEILKAG RIAETLVRDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRRNDL TEIFTRAGLINSSNPHFLAQIGTNYTSLIEFYIAYLKERKVYSRIQKKI LQGLNIQCHPLRDLQREPKNPQEEKAEIPLRGLFNEAIINCLKSKSL KQLIESPTREKSPALNVSYLILNYFRTYFEDQSQEFYAQPRNYRFLDKL SPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLEKEDRLYRKNY NEICDNESIIRLYQIQDILLFMMTKEYLPSDLYNRINKYKLENVKGILN ERVSYLIDLNPLKIQGEDIKIKDYGKLFYIHHDTRISSLNKVLSKVKRNN NSISSSVKIQPYENYKRECLDFEEAQIQIPIIHSFEIAMVSMFDPDLKKA TPGNYYDFNELITEYEKRTKQKIDSSFLIKTRNMFLHDKYEAECIKEIS DDFVYAKKIIAEFKMKIENIKLEDFSNDSSA
214	Cas13	MGAIENKHIFAAAYANLAIDGLIKTLNFIAKKLDQKQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYYHDPICIYPGGYDIPSSLNCIYDSAINIIE RFQAEKEMEHLRRYTRKKGRVVLKTEDDHFYTLANNNDLSEKGY AFFISMFLERKYSYFLKKLSGFKRGDSLQYRLTLEVFTALSTKPPVERL RTTKDTKQDRALDILNELSKIPIELYQTLEPKYREMYNETLQPTDAED PYGLPDRSRIRFRSRFETFALHFLDKQPDFKEIGFYTYLGNYPFHNGYQ KTRVDRETCDRYINFQLAGFCKNIQDISAKKLEALNVKSIDISTDSIP DINSFEPYLVQSMPHYIVNGNIGIKVLPEGKDTYPTIDEKGAKMPI ADFWLSKYELPAMLFYTYLRNNNIHKSHCPLSVKDIIERSIHKSTKQK HPEERSELMRRVMKAIFWTD SKLNEVERIKSQSAFGKRQHEILKA

		GRIAEMLV RDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRRN DLTEIFTRAGLINSSNHPFLAQIGTNYTSLIEFYIAYLKERKVYFSRIQK KILQGKLN IQCHPLRDLQREP NKPQEKEEAIFLPRGLFNEAIINCLKKS KLKQLIESPTREKSPALNVSYLIQNYFRAYFEDQSQEFYAQPRNYRLF DKLSPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLEKEDRLYRK NYNEICDNESIIRLYQIQDILLFMMTKEYLPSDLYNRINKYKLENVKGI LNERVSYLIDLNPLKIQGEDIKIKDYGKLFYIHHDRISLKNVLSKVKR NNSISSSVKIQPYENYKRECLDFEEAQIIPIIHSFEIAMVSMFPDLKK ATPGNYYDFNELITEYEKRTKQKIDSSFLIKTRNMF LHDKYEAECIKEIS DDFVYAKKIIAEFKMKIENIKLEDLSNDSSA
215	Cas13	MGAIKNKHIFAAAYANLAIDGLIKTLNFI AKKLD TQKQLSSWDIKHVIT LIDSIFDQNPQNNLEQVVEGYLPWIKPIIEMKTPKKGERQSDKLCIEY KTIITAFASLLNDVRNYYTHYYHDPICIYPPGGYDIPSSLNCIYDSAINIK ERFQAEKEMEHLRRYTRKKGRVVLKTEDDHFYTTLANNNDLSEKG YAFFISMFLERKYSYFLKKLSGFKRGD SLQYRLTLEVFTALSTKPPVER LRTTKDTKQDRALDILNELSKIPIELYQTLEPKYREMYNETLQPTDAE DPYGLPDRSRIRFRSRFEAFALHFLDKQADFKEIGFYTYLGNYFHNGY QKTRVDRET KDRIYINFQLAGFCKNIQDISAKKLSEALNVKSIDISTDSI PDINSFEPYLVQSTPHYIVNGNNIGIKVLPEGKDTYPTIDEKGAKMPI ADFWLSKYELPAMLFYTYLRNNNIHKSHCPLSVKDIIERSIHKSTKQK HPEERSELM LRRVMKAIFWTD SKLNEVERIKSQKSAFGKRQHEILKA GRIAETLV RDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRRN D LTEIFTRAGLINSSNHPFLAQIGTNYTSLIEFYIAYLKERKVYFSRIQKK ILQGKLN IQCHPLRDLQREP NKPQDKEEAIFLPRGLFNEAIINCLKKS LKQLIESPTREKSPALNVSYLIQNYFR TYFEDQSQEFYAQPRNYRLF D KLSPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLEKEDRLYRKN YNEICDNESIIRLYQIQDILLFMMTKEYLPSDLYNRINKYKLENVKGI LNERVSYLIDLNPLKIQGEDIKIKDYGKLFYIHHDRISLKNVLSKVKR N NSISSSVKIQPYENYKRECLDFEEAQIIPIIHSFEIAMVSMFPDLKKA TPGNYYDFNELITEYEKRTKQKIGSSFLIKTRNMF LHDKYEAECIKEIS DDFVYAKKIIAEFKMKIENIKLEDLSNDSSA
216	Cas13	MGKLYGYKRWYIEQNNGEKG SFKRKIRVKRVYDEESKSYVVRDE VEDTELIKNNFIINL KDYKTRNSNIQKFYDKFHVGNILFKLKASVKKG KKT FYKDLEKAETVLTNVEILEQTIKLANNSKINRKLEKELTQLNINEK SEEV TIDNIKIYLRQGEKFDKKENINAIKWRKLTSEELTIKVEIYRECQSI NSNLYSLLDYVLSNEEYDDRYYLEEVENKLLIFGTGNKNKNGRNYYYF DYVLKSLSKIKGLIKKDDRNLNLYLMFLFNIQKTSENKEHFINKIFNYFK

		YEVRIEKEDIVEFLVGELEYDLIKRIEKKPSENQNTNLEKTYILLDKH EKLKETIDTKNEIVQKLTIELKNNNLRNRRIEILHXYKILELVDKLNKNIK NGKINTELYGIYKEHYGQCIEYINFNELALEEKELYKIIYRYLKGRIEKLL QNRNKIKIGELRIEDIFIFQKLEKIEIRVKQYLLHILYLGLKHHNIDE VNTIRFVEEHANEELSLELITLFSATNVELNRLLKVKGENGSYKDYDF FSAKPDKGKIKIDTNSVMKFELLKLLKFINSEATETNQEAIDFLKEAY NLRNNILHGKNEEIIEDNKKNLSSYKNINELIEELRPSDNEICKSLNLD IIFKGNRKINDINAKLFGNNREKIYLPFSKLVPEIKNIESYDKNGTFN DERIKKIVLNGAIYVVKILYLKECSNKDGEFIKNLKEELNKDSKEKSKYV SIEELYKKSQSASKGNKKAIIYKQRKIIYLYLKENYVEILDFSKLNLN IEQIENDIKNRKNSENKVLIESIKQKVFPENDFEYIISIFALLNDNIFINKI RNRFFSTDWTLKNNRYSNIIKILDEVISVNLLRTELLNTSIDIEIKDDV LTEDIENIPEIREEILQRTKKDFKTLGNNNAISKEGLSNEDIDKIRNIED AKINLDFVNNEIKVSLKEYGSLPPNGVLSRNTSKYYNNEIAKKIDQISIL TFTKKSIGTISDEKFRNIYWQERKESDESKKIFVYNKNILYLVTKHSFEK LYKNFLEEELNNLKLEDTKYLRDLRREKNLKV DNTLKEINEKVRGY SKEYKKKFIENLKNNDYFGKVVSGRFKNYQEFKEIYDEVSEYKKIRD VVNFNPLNKVYNYLIEINWKLAIQMARAEERDLHYIVNGLNELKLIEL NQGGQNDGISRAYPKYKLNKEKNKKELRLEECHYNFDIDNYKKFEKIC EKLGLDSENGELQQENETNIRNYISHFYLRKPFVDISSEAIKRVSKLL SYRTRYNNSTYSSVFEVFKDVELNYDFLKKKIELNGKTYDEVVQRKK ISCLELESYLDYKPIIKKILF
217	Cas13	MGAIENKHIFAAAYANLAIDGLIKTLNFIKKLDTQKQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYYHDPICIYGGYDIPSSLNCIYDSAINIIE RFQAEKEMEHLRRYTRKKGRVVLKTEDDHFYTLANNNNDLSEKGY AFFISMFLERKYSYFLKKLSGFKRGDSLQYRLTLEVFTALSTKPPVERL RTTKDQTKQDRALDILNELSKIPIELYQTLPEKYREMYNETLQPTDAED PYGLPDRSRIRFRSRFEAFALHFLDKQADFKEIGFYTYLGNFYHNGYQ KTRVDRETKDRYINFQLAGFCKNIQDISAKKLSEALNVKSIDISTDSIP DINSFEPYLVQSTPHYIVNGNNIGIKVLPEGKDTYPTIDEKGAKMPIA DFWLSKYELPAMLFYTYLRNNNIHSHCPLSVKDIIERSIHKSTKQKH PEERSELMLRRVMKAIFWTD SKLNEVERIKSQKSAFGKRQHEILKAG RIAETLVRDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRRNDL TEIFTRAGLINSSNPHFLAQIGTNYTSLIEFYIAYLKERKVYFSRIQKKI LQGLNLIQCHPLRDLQREPKNPQEKKEAIFLPRGLFNEAIINCLKSKL KHLIESPTREKSPALNVSYLIQNYFRAYFEDQSQEFYAQPRNYRFDN LSPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLEKEDRLYRKNY NEICDNESIIRLYQIQDILLFMMTKEYLPDLYNRINKYKLENVKGILN ERSYSLIDLNLPLKIQGEDIKIKDYGKLFYIHHDRISLNLKVLSKVRNN

		SISSSVKIQPYENYKRECLDFEEAQIQIPIIHSFEIAMVSMFDPDLKKAT PGNYYDFNELITEYEKRTKQKIDSSFLIKTRNMFLHDKYEAECKEISD DFVYAKKIIAEFKMKIENIKLEDFSNDSSA
218	Cas13	MGAIKNKHIFAAAYANLAIDGLIKTLNFIKKLDTQKQLSSWDIKHVIT LIDSIFDQNPQNNLEQVVEGYLPWIKPIEMKTPKKGERQSDKLCIEY KTIITAFASLLNDVRNYYTHYYHDPICIYPGGYDIPSSLNCIYDSAINI ERFQAEKEMEHLRRYTRKKGRVVLKTEDDHFYTLANNNDLSEKG YAFFISMFLERKYSYFLKKLSGFKRGDSLQYRLTLEVFTALSTKPPVER LRTTKDTKQDRALDILNELSKIPIELYQTLEPKYREMYNETLQPTDAE DPYGLPDRSRIRFRSRFEAFALHFLDKQADFKEIGFYTYLGNFYHNGY QKTRVDRETCDRYINFQLAGFCKNIQDISAKKLEALNVKSIDISTDSI PDINSFEPYLVQSTPHYIVNGNIGIKVLPEGKDTYPTIDEKGAKMPI ADFWLSKYELPAMLFYTYLRNNNIHKSHCPLSVKDIIERSIHKSTKQK HPEERSELMRRVMKAIFWTD SKLNEVERIKSQKSAFGKRQHEILKA GRIAETLVRDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRNRD LTEIFTRAGLINSSNPHFLAQIGTNYTSLIEFYIAYLKERKVYFSRIQKK ILQGKLNQCHPLRDLQREPKNPQDKEEAIFLPRGLFNEAIINCLKSK LKQLIESPTREKSPALNVSYLIQNYFRTYFEDQSQEFYAQPRNYRLFD KLSPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLLEKEDRLYRKN YNEICDNESIIRLYQIQDILLFMMTKEYLPSDLYNRINKYKLENVKGIL NERVSYLIDLNPLKIQGEDIKIDYGKLFYIHHDRISLNVLSKVVRN NSISSSVKIQPYENYKRECLDFEEAQIQIPIIHSFEIAMVSMFDPDLKKA TPGNYYDFNELITEYEKRTKQKIGSSFLIKTRNMFLHDKYEAECKEIS DDFVYAKKIIAEFKMKIENIKLEDLSNDSSA
219	Cas13	MGAIKNKHIFAAAYANLAIDGLIKTLNFIKKLDTQKQLSSWDIKHVIT LIDSIFDQNPQNNLEQVVEGYLPWIKPIEMKTPKKGERQSDKLCIEY KTIITAFASLLNDVRNYYTHYYHDPICIYPGGYDIPSSLNCIYDSAINI ERFQAEKEMEHLRRYTRKKGRVVLKTEDDHFYTLANNNDLSEKG YAFFISMFLERKYSYFLKKLSGFKRGDSLQYRLTLEVFTALSTKPPVER LRTTKDTKQDRALDILNELSKIPIELYQTLEPKYREMYNETLQPTDAE DPYGLPDRSRIRFRSRFEAFALHFLDKQADFKEIGFYTYLGNFYHNGY QKTRVDRETCDRYINFQLAGFCKNIQDISAKKLEALNVKSIDISTDSI PDINSFEPYLVQSTPHYIVNGNIGIKVLPEGKDTYPTIDEKGAKMPI ADFWLSKYELPAMLFYTYLRNNNIHKSHCPLSVKDIIERSIHKSTKQK HPEERSELMRRVMKAIFWTD SKLNEVERIKSQKSAFGKRQHEILKA GRIAETLVRDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRNRD LTEIFTRAGLINSSNPHFLAQIGTNYTSLIEFYIAYLKERKVYFSRIQKK

		ILQGKLNQCHPLRDLQREPKNKPDKEEAIFLPRGLFNEAIINCLKSK LKQLIESPTREKSPALNVSYLIQNYFRTYFEDQSQEFYAQPRNYRLFD KLSPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLLEKEDRLYRKN YNEICDNESIIRLYQIQDILLFMMTKEYLPSDLYNRINKYKLENVKGIL NERVSYLIDLNPLKIQQGEDIKIDYGKLFYIHHDRISLKNVLSKVVRN NSISSSVKIQPYENYKRECLDFEEAQIQIPIIHSFEIAMVSMFDPDLKKA TPGNYYDFNELITEYEKRTKQKIGSSFLIKTRNMFHDKYEAECIKEIS DDFVYAKKIIAEFKMKIENIKLEDLSNDSSA
220	Cas13	MGKLYGYKRWYIEQNNGEKGSFKRKIRVKRVYDEESKSYVVRDE VEDTELIKNNFIINLKDYKTRNSNIQKFYDKFHVGNILFKLKASVKKG KKTfYKDLEKAETVLTNVEILEQTIKLANNISKINRKKLEKELTQLNINEK SEEVTDIDNIKIYLRQGEKFDKKENINAIKWRKLTSEELTIKVEIYRECQSI NSNLYSLDYVLSNEEYDDRYYLEEVENKLLIFGTGNKNKNGRNYYYF DYVLKSLSKIKGLIKDDRNLYLMFLNIQKTSSENKEHFINKIFNYFK YEVRIEKEDIVEFLVGELEYDLIKRIEKKPSENQNTNLEKTYILLDKH EKLKETIDTKNEIVQKLTIELKNNLNLRNRIIILHKYKILEVDKLNKNIK NGKINTELYGIYKEHYGQCIEYINFNELALEEKELYKIYRYLKGRIEKLL QNRNKKIKIGELRIEDIFIFQKLEKIEIRVKQYLLHILYLGKLLHHNIDE VNTIRFVEEHANEELSLELITFSATNVELNRLLKVKGENGSYKDYDF FSAKPDKGKIKIDTNSVMKFELLKLLKFINSEATETNQEAIDFLKEAY NLRNNILHGKNEEIIEDNKKNLSKSYKNINELIEELRPSDNEICKSLNLD IIFKGNRKINDINAKLFGNNREKIYLPFSKLVPEIKNIIESYDKNGTFN DERIKKIVLNGAIYVKNILYLKECSNKDGEFIKNLKEELNKDSKEKSKYV SIEELYKKSQISASKGNKKAIFYQYRKIIYLYLKENYVEILDFSKLNLN IEQIENDIKNRKNSENKVLIESIKQKVPENDFEYIISIFALLNDNIFINKI RNRFFSTDWTLKNNRYSNIIKILDEVISVNLRLTELLNTSIDIEIKDDV LTEDIENIPEIREEILQRTKKDFKTLLGNNNAISKEGLSNEDIDKIRNIED AKINLDFVNNEIKVSLKEYGSLPPNGVLSRNTSKYYNNEIAKKIDQISIL TFTKKSIGTISDEKFRNIYWQERKESDESKKIFVYNKNILYLVTKHSFEK LYKNFLEEELNNLKLEDTKYLRDLRLREKNLKV DNTLKEINEKVRGY SKEYKKKFIENLKNND EYFGKVVSGRFKNYQEFKEIYDEVSEYKKIRD VVNFNPLNKVYNYLIEINWKLAIQMARAEADLHYIVNGLNELKLIEL NQGQNDGISRAYPKYKLNKEKNKKELRLEECHYNFDIDNYKKFEKIC EKLIDLSENGELQQENETNIRNYISHFYLRKPFVDISISEAIKRVSKLL SYRTRYNNSTYSSVFEVFKDVELNYDFLKKKIELNGKTYDEVVQRKK ISCLELESYLDYKPIIKKILF
221	Cas13	MGAIVENKHIFAAAYANLAIDGLIKTLNFIKKLDTQKQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYYHDPICIYPGGYDIPSSLNCIYDSAINIIE

		RFQAEKEIEHLRRYTRKKGRVVLKTEDDHFYITLVNNNDLSEKGYA FFISMFLERKYSYFLKKLSGFKRGDSLQYRLTLEVFTALSTKPPVERLR TTKDTKQDRALDILNELSRIPIELYQTLEPKYREMYNETLQPTDAEDP YGLPDRSRIRFRSRFEAFALHFLDKQADFKEIGFYTYLGNYFHNGYQK TRVDRETCDRYINFQLAGFCKNIQDISAKKLSEALNVKSIDISTDSIPDI NSFEPYLVQSTPHYIVNGNNGIKVLPEGKDTYPTIDEKGAKMPIADF WLSKYELPAMLFYTYLRNNNIHKSHCPLSVKDIIERSIHKSTKQKHPE ERSELMRLRRVMKAIFWTD SKLNEVERIKSQKSAFGKRQHEILKAGRI AETLVRDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRRNDLTE IFTRAGLINSSNPHFLAQIGTNYTSLIEFYIAYLKERKVYFSRIQKKILQ GKLNQCHPLRDLQREPKNKPQKEEAIFLPRGLFNEAIINCLKSKLK QLIESPTREKSPALNVSYLIQNYFRTYFEDQSQEFYAQPRNYRFLDKL SPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLLEKEDRLYRKNY NEICDNESIIRLYQIQDILLFMMTKEYLPSDLYNRINKYKLENVKGILN ERVSYLIDLNPLKIQGEDIKIDYGKLFYIHHDRISLNVLSKVVRNN SISSSVKIOPYENYKRECLDFEEAQIPIIHSFEIAMVSMFDPDLKAT PGNYYDFNELITEYEKRTKQKIDSSFLIKTRNMFLHDKYEAECIKEISD DFVYAKKIIAEFKMKIENIKLEDLSNDSSA
222	Cas13	MGAIENKHIFAAAYANLAIDGLIKTLNFIKKLDTQKQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYHDPICIYGGYDIPSSLNCIYDSAINIIE RFQAEKEMEHLRRYTRKKGRVVLKTEDDHFYITLVNNNDLSEKGY AFFISMFLERKYSYFLKKLSGFKRGDSLQYRLTLEVFTALSTKPPVERL RTTKDTKQDRALDILNELSKIPIELYQTLEPKYREMYNETLQPTDAED PYGLPDRSRIRFRSRFEAFALHFLDKQADFKEIGFYTYLGNYFHNGYQ KTRVDRETCDRYINFQLAGFCKNIQDISAKKLSEALNVKSIDISTDSIP DINSFEPYLVQSTPHYIVNGNNGIKVLPEGKDTYPTIDEKGAKMPIA DFWLSKYELPAMLFYTYLRNNNIHKSHCPLSVKDIIERSIHKSTKQKH PEERSELMRLRRVMKAIFWTD SKLNEVERIKSQKSAFGKRQHEILKAG RIAETLVRDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRRNDL TEIFTRAGLINSSNPHFLAQIGTNYTSLIEFYIAYLKERKVYFSRIQKKI LQGKLNQCHPLRDLQREPKNPQKEEAIFLPRGLFNEAIINCLKSKL KHLIESPTREKSPALNVSYLIQNYFRAYFEDQSQEFYAQPRNYRFLDN LSPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLLEKEDRLYRKNY NEICDNESIIRLYQIQDILLFMMTKEYLPSDLYNRINKYKLENVKGILN ERVSYLIDLNPLKIQGEDIKIDYGKLFYIHHDRISLNVLSKVVRNN SISSSVKIOPYENYKRECLDFEEAQIPIIHSFEIAMVSMFDPDLKAT PGNYYDFNELITEYEKRTKQKIDSSFLIKTRNMFLHDKYEAECIKEISD DFVYAKKIIAEFKMKIENIKLEDLSNDSSA

223	Cas13	MGAIENKHIFAAAYANLAIDGLIKTLNFIKKLDTQKQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYYHDPICIYPGGYDIPSSLNCIYDSAINIIKE RFQAEKEMEHLRRYIRKKGRVVLKTEDDHFYTLANNNDLSEKGY AFFISMFLERKYSYFLKKLSGFKRGDSLQYRLTLEVFTALSTKPPVERL RTTKDTKQDRALDILNELSRIPIELYQTLEPKYREMYNETLQPTDAED PYGLPDRSRIRFRSRFEAFALHFLDKQADFKEIGFYTYLGNYFHNGYQ KTRVDRETKDRYINFQLAGFCKNIQDISAKKLSEALNVKSIDISTDSIP DINSFEPYLVQSTPHYIVNGNIGIKVLPEGKDTYPTIDEKGAKMPIA DFWLSKYELPAMLFYTYLRNNNIHKSHCPLSVKDIIERSIHKSTKQKH PEERSELMRRVMKAIFWTDSKLNEVERIKSQKSAFGKRQHEILKAG RIAETLVRDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRRNDL TEIFTRAGLINSSNPHFLAQIGTNYTSLIEFYIAYLKERKVYFSRIQKKI LQGKLNQCHPLRDLQREPKNPQKEEEAIFLPRGLFNEAIINCLKSKSL KQLIESPTREKSPVLNVSYLIQNYFRAYFEDQSQEFYAQPRNYRLFDK LSPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLEKEDRLYRKNY NEICDNESIIRLYQIQDILLFMMTKEYLPSDLYNRINKYKLENVKGILN ERVSYLIDLNPLKIQGEDIKIDYGKLFYIHHDRISLNKVLKSVKRRNN SISSSVKIQPYENYKRECLDFEEAQIQIPIIHSFEIAMVSMFPDLKKAT PGNYYDFNELITEYKRTKQKIDSSFLIKTRNMFLHDKYEAEIKIEISD DFVYAKKIIAEFKMKIENIKLEDFSNDSSA
224	Cas13	MGAIENKHIFAAAYANLAIDGLIKTLNFIKKLDTQKQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYYHDPICIYPGGYDIPSSLNCIYDSAINIIKE RFQAEKEMKHLRNYTLVNNNGLSEKGYAFFISKFLERKYSYFLKKL SGFKRGDSLQYRLTLEVFTALSTKPPVERLRTTKDTKQDRALDILNELS KIPIELYQTLEPKYREMYNETLQPTDAEDPYGLPDRSRIRFRSRFEAFALHFLDKQADFKEIGFYTYLGNYFHNGYQKTRVDRETKDRYINFQLAGFCKNIQDISAKKLSEALNVKSIDISTDSIPDINSFEPYLVQSTPHYIVNGNIGIKVLPEGKDTYPTIDEKGAKMPIADFWLSKYELPAMLFYTYLRNNNIHKSHCPLSVKDIIERSIHKSTKQKHPEERSELMRRVMKAIFWTDSKLNEVERIKSQKSAFGKRQHEILKAGRIAETLVRDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRRNDLTEIFTRAGLINSSNPHFLAQIGTNYTSLIEFYIAYLKERKVYFSRIQKKILQGKLNQCHPLRDLQREPKNPQKEEEAIFLPRGLFNEAIINCLKSKSLKQLIESPTREKSPALNVSYLIQNYFRTYFEDQSQEFYAQPRNYRLFDKLSPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLEKEDRLYRKNYNEICDNESIIRLYQIQDILLFMMTKEYLPSDLYNRINKYKLENVKGILNERVSYLIDLNPLKIQGEDIKIK

		DYGKLFYIHHDRINSLNKVLSKVKRNNSSSSSVKIQPYENYKRECLDF EEAQIQIPIIHSFEIAMVSMFDPDLKKATPGNYYDFNELITEYEKRTKQ KIDSSFLIKTRNMFHDKYEAECIKEISDDL VYAKKIIAEFKMKIENIKLE DLSNDSSA
225	Cas13	MGAIKNKHIFAAAYANLAIDGLIKTLNFIKKLDTQKQLSSWDIKHVIT LIDSIFDQNPQNNLEQVVEGYLPWIKPIEMKTPKKGERQSDKLCIEY KTITAFASLLNDVRNYYTHYYHDPICIYPGGYDIPSSLNCIYDSAINIIE ERFQAEEKEMEHLRRYTRKKGRVVLKTEDDHFYTLANNNDLSEKG YAFFISMFLERKYSYFLKKLSGFKRGDSLQYRLTLEVFTALSTKPPVER LRTTKDTKQDRALDILNELSKIPIELYQTLEPKYREMYNETLQPTDAE DPYGLPDRSRIRFRSRFEAFALHFLDKQADFKEIGFYTLGNYFHNGY QKTRVDRETCDRYINFQLAGFCKNIQDISAKKLEALNVKSIDISTDSI PDINSFEPYLVQSTPHYIVNGNNIGIKVLPEGKDTYPTIDEKGAKMPI ADFWLSKYELPAMLFYTYLRNNNIHKSHCPLSVKDIERSIHKSTKQK HPEERSEMLRRVMKAIFWTD SKLNEVERIKSQKSAFGKRQHEILKA GRIAETLVRDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRRND LTEIFTRAGLINSSNPHFLAQIGTNYTSLIEFYIAYLKERKVYSRIQKK ILQGKLNQCHPLRDLQREPKNPQDKKEAIFLPRGLFNEAIINCLKSK LKQLIESPTREKSPALNVSYLIQNYFRTYFEDQSQEFYAQPRNYRLF KLSPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLLEKEDRLYRKN YNEICDNESIIRLYQIQDILLFMMTKEYLPSDLYNRINKYKLENVKIL NERVSYLIDLNLPLKIQGEDIKIDYGKLFYIHHDRISLNLKVLKVKRN NSISSSVKIQPYENYKRECLDFEEAQIQIPIIHSFEIAMVSMFDPDLKKA TPGNYYDFNELITEYEKRTKQKIGSSFLIKTRNMFHDKYEAECIKEIS DDFVYAKKIIAEFKMKIENIKLEDLSNDSSA
226	Cas13	MGAIKNKHIFAAAYANLAIDGLIKTLNFIKKLDTQKQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYYHDPICIYPGGYDIPSSLNCIYDSAINIIE RFQAEEKEMEHLRRYTRKKGRVVLKTEDDHFYTLANNNDLSEKGY AFFISMFLERKYSYFLKKLSGFKRGDSLQYRLTLEVFTALSTKPPVERL RTTKDTKQDRALDILNELSRPIELYQTLEPKYREMYNETLQPTDAED PYGLPDRSRIRFRSRFEAFALHFLDKQADFKEIGFYTLGNYFHNGYQ KTRVDRETCDRYINFQLAGFCKNIQDISAKKLEALNVKSIDISTDSIP DINSFEPYLVQSTPHYIVNGNNIGIKVLPEGKDTYPTIDEKGAKMPIA DFWLSKYELPAMLFYTYLRNNNIHKSHCPLSVKDIERSIHKSTKQKH PEERSEMLRRVMKAIFWTD SKLNEVERIKSQKSAFGKRQHEILKAG RIAETLVRDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRRNDL

		TEIFTRAGLINSSNPHFLAQIGTNYTSLIEFYIAYLKERKVYFSRIQKKI LQGKLNQCHPLRDLQREPKNPQEKEEAIFLPRGLFNEAIINCLKSKSL KQLIESPTREKSPALNVSYLILNYFRTYFEDQSQEFYAQPRNYRLFDKL SPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLLEKEDRLYRKNY NEICDNESIIRLYQIQDILLFMMTKEYLPSDLYNRINKYKLENVKGILN ERVSYLIDLNLPLKIQGEDIKIKDYGKLFYIHHDTRINSLNKVLSKVKRNN NSISSSVKIQPYENYKRECLDFEEAQIQIPIIHSFEIAMVSMFDPDLKKA TPGNYYDFNELITEYEKRTKQKIDSSFLIKTRNMFLHDKYEAECKEIS DDFVYAKKIIAEFKMKIENIKLEDFSNDSSA
227	Cas13	MGAIENKHIFAAAYANLAIDGLIKTLNFIKKLDTQKQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYYHDPICIYPGGYDIPSSLNCIYDSAINIIE RFQAEKEMEHLRRYTRKKGRVVLKTEDDHFYTLANNNDLSEKGY AFFISMFLERKYSYFLKKLSGFKRGDSLQYRLTLEVFTALSTKPPVERL RTTKDTKQDRALDILNELSKIPIELYQTLEPKYREMYNETLQPTDAED PYGLPDRSRIRFRSRFEAFALHFLDKQADFKEIGFYTYLGNFYHNGYQ KTRVDRETKDRYINFQLAGFCKNIQDISAKKLSEALNVKSIDISTDSIP DINSFEPYLVQSTPHYIVNGNIGIKVLPEGKDTYPTIDEKGAKMPIA DFWLSKYELPAMLFYTYLRNNNIHSHCHPLSVKDIERSIHKSTKQKH PEERSELMRRVMKAIFWTD SKLNEVERIKSQKSAFGKRQHEILKAG RIAETLVDRDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRRNDL TEIFTRAGLINSSNPHFLAQIGTNYTSLIEFYIAYLKERKVYFSRIQKKI LQGKLNQCHPLRDLQREPKNPQEKEEAIFLPRGLFNEAIINCLKSKSL KHLIESPTREKSPALNVSYLIQNYFRAYFEDQSQEFYAQPRNYRLFDN LSPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLLEKEDRLYRKNY NEICDNESIIRLYQIQDILLFMMTKEYLPSDLYNRINKYKLENVKGILN ERVSYLIDLNLPLKIQGEDIKIKDYGKLFYIHHDTRISSLNKVLSKVKRNN SISSSVKIQPYENYKRECLDFEEAQIQIPIIHSFEIAMVSMFDPDLKAT PGNYYDFNELITEYEKRTKQKIDSSFLIKTRNMFLHDKYEAECKEISD DFVYAKKIIAEFKMKIENIKLEDFSNDSSA
228	Cas13	MGAIENKHIFAAAYANLAIDGLIKTLNFIKKLDTQKQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYYHDPICIYPGGYDIPSSLNCIYDSAINIIE RFQAEKEMEHLRRYTRKKGRVVLKTEDDHFYTLANNNDLSEKGY AFFISMFLERKYSYFLKKLSGFKRGDSLQYRLTLEVFTALSTKPPVERL RTTKDTKQDRALDILNELSKIPIELYQTLEPKYREMYNETLQPTDAED PYGLPDRSRIRFRSRFEAFALHFLDKQADFKEIGFYTYLGNFYHNGYQ

		KTRVDRETKDRYINFQLAGFCKNIQDISAKKLSEALNVKSIDISTDSIP DINSFEPYLVQSTPHYIVNGNNIGIKVLPEGKDTYPTIDEKGAKMPIA DFWLSKYELPAMLFYTYLRNNNIHKSHCPLSVKDIERSIHKSTKQKH PEERSELMRRVMKAIFWTD SKLNEVERIKSQSAFGKRQHEILKAG RIAETLVRDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRRNDL TEIFTRAGLINSSNPHFLAQIGTNYTSLIEFYIAYLKERKVYFSRIQKKI LQGKLNQCHPLRDLQREPKNPQKEEAIPLPRGLFNEAIINCLKSKSL KHLIESPTREKSPALNVSYLIQNYFRAYFEDQSQEFYAQPRNYRFLDN LSPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLLEKEDRLYRKNY NEICDNESIIRLYQIQDILLFMMTKEYLPDLYNRINKYKLENVKGILN ERSYILIDLNPLKIQGEDIKIDYGKLFYIHHDRISLKNVLSKVKRNN SISSSVKIQPYENYKRECLDFEEAQIPIIHSFEIAMVSMFPDLKKAT PGNYYDFNELITEYKRTKQKIDSSFLIKTRNMFLHDKYEAECIKEISD DFVYAKKIIAEFKMKIENIKLEDFSNSSA
229	Cas13	MEKPLLPNVYTLKHKFFWGAFLNIARHNAFITICHINEQLGLKTPSN DDKIVDVVCETWNNILNNDHDLKKSQLTELILKHPFLTAMCYHPP KKEGKKKGHGKQEQKEKESEAQSQAELNPSKLEALEILVNQLHSL RNYYSHYKHKKPDAEKDIFKHLYKAFDASLRMVKEDYKAHFTVNLTR DFAHLNRKGKKNQDNPDFNRYRFEKDGFFTESGLLFFTNLFLDKRD AYWMLKKVSGFKASHKQREKMTTEVFCSRILLPKLRLESRYDHNQ MLLDMSELSCPKLLYEKLSEENKKHFQVEADGFLDEIEEEQNPFK DTLIRHQDRFPYFALRYDLNESFKSIRFQVDLGTYHYCIYDKKIGDEQ EKRLHTRTLLSFGRLQDFTEINRPQEWKALTKDLDYKETSQNPFIKT TPHYHITDNKIGFRLGTSKELYPSEIKDGANRIAKYPYNSGFVAHAFI SVHELLPLMFYQHLTGKSEDLLKETVRHIQRIYKDFEEERINTIEDLEK ANQGRPLPGAFPKQMLGLLQNKQPDSEKAKIKIEKLAETKLLSHRL NTKLKSSPKLGKRREKLIKTVGLADWLKDFMRFPVAYDAQNQPI KSSKANSTEFWFIRRALALYGGEKNRLEGYFKQTNLIGNTNPHPLN KFNWKACRNLVDFYQQYLEQREKFLEAIKNQPWEPYQYCLLLKIPKE NRKNLVKGWEQGGISLPRGLFTEAIRETSEDMLMSKPIRKEIKKHGR VGFISRAITLYFKEKYQDKHQSFYNLSYKLEAKAPLLKREEHYEYWQQ NKPQSPTESQRLELHTSDRWKDYLLYKRWQHLEKKLRLYRNQDVM LWLMTELTKNHFKELNLNYHQLKENLAVNVQEADAKLNPLNQT PMVLPVKVYPATAFGEVQYHKTPIRTVYIREEHTKALKMGNFKALVK DRRLNGLFSFIKEENDTQKHPISQLRLRRELEIYQSLRVDAFKETLSLEE KLLNKHTSLSSLENEFRALLEEWKKEYAASSMVTDEHIAFIASVRNAF CHNQYPFYKEALHAPIPLFTVAQPTTEEKDGLGIAEALLKVLREYCEIV KSQI

230	Cas13	MEKPLLPNVYTLKHKFFWGAFLNIARHNAFITICHINEQLGLKTPSN DDKIVDVVCETWNNILNNDHDLKKSQLTEILKHFPLTAMCYHPP KKEGKKKGHQKEQQKEKESEAQSQAELNPSKLEALEILVNQLHSL RNYYSHYKHKKPDAEKDIFKHLYKAFDASLRMVKEDYKAHFTVNLTR DFAHLNRKGKNKQDNPDFNRYRFEKDGFFTESGLLFFTNFLDKRD AYWMLKKVSGFKASHKQREKMTTEVFCSRILLPKLRLESRYDHNQ MLLDMLSELSRCPKLLYEKLSEENKKHFQVEADGFLDEIEEEQNPFK DTLIRHQDRFPYFALRYLDLNEFSKSIRFQVDLGTYHYCIYDKKIGDEQ EKRHLTRTLLSFGRLQDFTEINRPQEWKALTKDLDYKETSNOFPISK TPHYHITDNKIGFRLGTSKELYPSEIKDGANRIAKYPYNSGFVAHAFI SVHELLPLMFYQHLTGKSEDLLKETVRHIQRIYKDFEERINTIEDLEK ANQGRLPLGAFPKQMLGLLQNKQPDSEKAKIKIEKLAETKLLSHRL NTKLKSSPKLGKRREKLIKTVGLADWLKDFMRFPQVAYDAQNQPI KSSKANSTEFWFIRRALALYGGEKNRLEGYFKQTNLIGNTNPHFPLN KFNWKACRNLDVDFYQQYLEQREKFLEAIKNQPWEPYQYCLLLKIPKE NRKNLVKGWEQGGSILPRGLFTEAIRETSEDMLSKPIRKEIKKHGR VGFISRAITLYFKEKYQDKHQSFYNLSYKLEAKAPLLKREEHYEYWQQ NKPQSPTESQRLELHTSDRWKDYLLYKRWQHLEKKLRLYRNQDVM LWLMTELTKNHFKELNLYHQLKENLAVNVQEADAKLNPLNQTL PMVLPVKVYPATAFGEVQYHKTPIRTVYIREEHTKALKMGNFKALVK DRRLNGLFSFIKEENDTQKHPISQLRLRRELEIYQSLRVDAFKETLSLEE KLLNKHTSLSSLENEFRALLEEWKKEYAASSMVTDEHIAFIASVRNAF CHNQYPFYKEALHAPIPLFTVAQPTTEEKDGLGIAEALLKVLREYCEIV KSQI
231	Cas13	MDTPNFSEIPVSLQSHPYFAHYLNMARHNAYVILEYVNRELKPG KNLDEDNLIQSTVLKDGDFDRKPDELSHRNRLLVQHFPFLREAENEG ARTCNVSYKLKTALAALNQWRNNASHYPLNQNEHKDFDLQPFES FAIEACKKRMREVFQPDDFYLLETNEKQFYTLHNENGFTTEKGLYCFIC FFLEKKYAFQFLAGIKGFKNTTDNKFRALETTEHCCRLPKPKLDSS DIKLDMLGELSRCAPLFDLLDIEERKKFIREPEEVKPDSESGDREEVQ QVLMKRYDDRFYPYFALRYFEEKNLLKGISFHHIGRWIKSEHTTKIMG AERDRRLKDIRTFGELKEFSPEHAPDYWLRDGITPDDVDQFSPQYR IVGNRIGIKLNYNGHNRSVPDKEINVKPDAAISTYEFNLFLYEHLY QKKLTGLSPAEFIQDYLDRFNNFLSEFKAGHIRPVGDFSLEKRRGGG DEPDLTARRKSLQKELDRFVLKGKDLDPKIREYLLGYKQKSEKKQAK WILGGMKETVYWRNKAEQSPEKMRSGDMAQQLARDIIFLTPPHT VKEHKQKLNSLEYDVLQYALAYFSSNREKLYSFFKEHQLTVKGDRAH PFLYKIRLDECQGILDFFIVYMQQKEKWLGWLDRLNLSRPNLEEEFF NTYSYFIKTDTKRAIEMDYESCPNYLPRGIFNEPIAKALQAGVKIKDE DNASYALSVYSNGKTQPFYKERYNKGIFRMEELPEKLQPKELLGKI

		QWTIKSSGKDTTEFRSLQNLKNRILNTEKEIRYVQSTDRLWIMVAD LFPETFELRPDDLEICIGHDLSDDLRSRYPYQMKKEKVNYTITDYLPIKRY GEFRRFLKDRRLNLLTYFEEGVPLHREALVAELEAYDLQRKNLLEIY RFEKLVFDRHRHELTFSGEGENQYVNHWDYLDVFARKYGLSAEVKE LNSERFTELNRKMLHNQIPYQLWIKEAIAAREENTVCGRIMGMIGEI YERMTTEIEKQMQV
232	Cas13	MEKPLLPNVYTLKHKFFWGAFNLNARHNAFITICHINEQLGLKTPSN DDKIVDVVCEWNNILNNDHDLKKSQTEILILKHFPLTAMCYHPP KKEGKKKGHQKEQQKEKESEAQSQAELNPSKLEALEILVNQLHSL RNYYSHYKHKPDAEKDIFKHLYKAFDASLRMVKEDYKAHFTVNLTR DFAHLNRKGKKNQDNPDFNRYRFEKDGFFTESGLLFFTNLFLDKRD AYWMLKKVSGFKASHKQREKMTTEVFCSRILLPKLRLESRYDHNQ MLLDMSELSRCPKLLYEKLSEENKKHFQVEADGFLDEIEEEQNPFK DTLIRHQDRFPYFALRYLDLNESEKSFQVLDLGYHYCIYDKKIGDEQ EKRHLTRTLLSFGRLQDFTEINRPQEWKALTKDLDYKETSQPFISKT TPHYHITDNKIGFRLGTSKELYSLEIKDGANRIAKYPYNSGFVAHAFI SVHELLPLMFYQHLTGSSEDLKETVRHIQRIYKDFEEERINTIEDLEK ANQGRPLPGAFPKQMLGLLQNKQPDSEKAKIKIEKLAETKLLSHRL NTKLKSSPKLGRREKLIKTVGLADWLVKDFMRFPQVAYDAQNQPI KSSKANSTEFWFIRRALALYGGEKNRLEGYFKQTNLIGNTNPHFLN KFNWKACRNLDVDFYQQYLEQREKFLEAIKNQPWEPYQYCLLLKIPKE NRKNLVKGWEQGGISLPRGLFTEAIRETLESDMLSKPIRKEIKKHGR VGFISRAITLYFKEKYQDKHQSFYNLSYKLEAKAPLLKREEHYEYWQQ NKPQSPTESQRLELHTSDRWKDYLLYKRWQHLEKKLRLYRNQDVM LWLMTELTKNHFKELNLNYHQLKENLAVNVQEADAKLNPLNQTL PMVLPVKVYPATAFGEVQYHKTPIRTVYIREEHTKALKMGNFKALVK DRRLNGLFSFIKEENDTQKHPISQLRLRRELEIYQSLRVDAFKETLSLEE KLLNKHTSLSSLENEFRALLEEWKKEYAASSMVTDEHIAFIASVRNAF CHNQYPFYKEALHAPIPLFTVAQPTTEEKDGLGIAEALLKVLREYCEIV KSQI
233	Cas13	MENKTSLGNNIYYPFKPQDKSYFAGYFNAAMENTDSVFRELGKRL KGKEYTSENFDAIFKENISLVEYERYVKLLSDYFPMARLLDKKEVPIK ERKENFKKNFKGIKAVRDLRNFYTHKEHGEVEITDEIFGVLDMLKS TVLTVKKKKVKTDKTEILKKSIEKQLDILCQKKLEYLRDTARKIEEKR NQRERGEKELVAPFKYSDKRDDLIAAIYNDAFDVYIDKKKDSLKSSK AKYNTKSDPQQEEDLKIPISKNGVVFLSLFTKQEIHAFKSKIAGFK ATVIDEATVSEATVSHGKNSICFMATHEIFSHLAYKKLKRKVRTAEIN

		YGEAENAEQLSVYAKETLMMQMLDELSKVPDVVYQNLSEDVQKTF IEDWNEYLKENNGDVGTMEEEQVIHPVIRKRYEDKFNYFAIRFLDEF AQFPTLRFQVHLGNYLHDSRPKENLISDRRIKEKITVFGRLSELEHKKA LFIKNTETNEDREHYWEIFPNPNYDFPKENISVNDKDFPIAGSILDRE KQPVAGKIGIKVKLLNQYVSEVDKAVKAHQLKQRKASKPSIQNIIEE IVPINESNPKEAIVFGGQPTAYLSMNDIHSILYEFFDKWEKKKEKLEK KGEKELRKEIGKELEKKIVGKIQAQIQQIIDKDTNAKILKPYQDGNSTA IDKEKLIKDLKQEQNILQKLKDEQTVREKEYNDFIAYQDKNREINKVR DRNHKQYLKDNLKRKYPEAPARKEVLYYREKGVAVVWLANDIKRF MPTDFKNEWKGEQHSLLQKSLAYYEQCKEELKNLLPEKVFQHLPFK LGGYFQQKYLYQFYTCYLDKRLEYISGLVQQAENFKSENKVFVKVEN ECFKFLKKQNYTHKELDARVQSILGYPIFLERGFMDKPTIIGKGTFCG NEALFADWFRYYKEYQNFQTFYDTENYPLVELEKKQADRKRKTKIYQ QKKNDVFTLLMAKHIFKSVFKQDSIDQFSLEDLYQSREERLGNQERA RQTGERNTNYIWNKTVDLKLCDGKITVENVKLKNVGDIFKYEYDQR VQAFLKYEENIEWQAFLIKESKEEENYPYVVEREIEQYKVRREELLKE VHLEEEYILEKVKDKELKKGDNQNFKYYILNGLLKQLKNEDVESYKVF NLNTEPEDVNINQLKQEATDLEQKAFVLTYIRNKFAHNQLPKKEFW DYCQEKYKGIEKEKTYAEYFAEVFKKEKEALIK
234	Cas13	MEKPLLPNVYTLKHKFFWGAFLNIARHNAFITICHINEQLGLKTPSN DDKIVDVVCETWNNILNNDHDLKKSQLTELILKHPFLTAMCYHPP KKEGKKKGHQQEQKEKESEAQSQAELNPSKLEALEILVNQLHSL RNYSSHYYKHKKPDAEKDIFKHLYKAFDASLRMVKEDYKAHFTVNLTR DFAHLNRKGKNKQDNPDFNRYRFEKDGFFTESGLLFFTNLFLDKRD AYWMLKKVSGFKASHKQREKMTTEVFCSRILLPKLRLESRYDHNQ MLLDMLSELSRCPKLLYEKLSEENKKHFQVEADGFLDEIEEEQNPFK DTLIRHQDRFPYFALRYDLNESFKSIRFQVDLGTYHYCIYDKKIGDEQ EKRHLTRTLLSFGRLQDFTEINRPQEWKALTKDLDYKETSQNPFIKT TPHYHITDNKIGFRLGTSKELYPSLEIKDGANRIAKYPYNSGFVAHAFI SVHELLPLMFYQHLTGKSEDLLKETVRHIQRIYKDFEEERINTIEDLEK ANQGRLPLGAFPKQMLGLLQNKQPDLEKAKIKIEKLAETKLLSHRL NTKLKSSPKLGKRREKLIKTVGLADWLKDFMRFPQPVAYDAQNQPI KSSKANSTEFWFIRRALALYGGEKNRLEGYFKQTNLIGNTNPHPLN KFNWKACRNLVDFYQQYLEQREKFLEAIKNQPWEPYQYCLLLKIPKE NRKNLVKGWEQGGISLPRGLFTEAIRETLSEDMLSKPIRKEIKKHGR VGFISRAITLYFKEKYQDKHQSFYNLSYKLEAKAPLLKREEHYEYWQQ NKPQSPTESQRLELHTSDRWKDYLLYKRWQHLEKKLRLYRNQDVM LWLMTLELTKNHFKELNLNYHQLKENLAVNVQEADAKLNPLNQLTL PMVLPVKVYPATAFGEVQYHKTPIRTVYIREEHTKALKMGNFKALVK DRRNLGLFSFIKEENDTQKHPISQLRLRRELEIYQSLRVDFAKETLSLEE

		KLLNKHTSLSSLENEFRALLEEWKKEYAASSMVTDEHIAFIASVRNAF CHNQYPFYKEALHAPIPLFTVAQPTTEEKDGLGIAEALLKVLREYCEIV KSQI
235	Cas13	MTEQSERPYNGTYITLEDKHFWA AFLNLARHNAYITLTHIDRQLAYS KADITNDQDVL SFKALWKNLDNDLERKSRLRSLILKHFSFLEGAAYG KKLFESKSSGNKSSKNKELTKKEKEELOQANALSLDNLKSILFDLQKLK DFRNYYSHYRHSGSSELPLFDGNMLQRLYNVFDVSVQVRKRDHEH NDKVDPHYHFNHLVRKGKKDRYGHNDNPSFKHHFVDESEGMVTEA GLLFFVSLFLEKRDAIWMQKKIRGFKGGTGPYEQMTNEVFCRSRISL PKLKLESLRTDDWMLDMLNELVRCPKPLYDRLREKDRACFRVPVDI LPDEDDTDGGGEDPFGNTLV RHQDRFPYFALRYFDLKKVFTSLRFHI DLGTYHFAIYKKMIGE QPEDRHLTRNLYGFGRIQDFAEEHRPEEWK RLVRDL DYLETGDKPYISQTPHYHIEKGIGLRFVPEGQHLWPSPEV GTTRTGRSKCAQDKRLTAEAFLSVHELMPMMFYFLLREKYSEEVS AEKVQGRIKRVIEDVYAIYDAFARDEINTLKELDTCLADKGIRRGHLP KQMITILSQRKMDMKEKIRKKLQEMIADTDHRLDMLDRQTDKIRI GRKNAGLPKSGVIADWLVRDMMRFQPVAKDASGKPLNNSKANST EYRMLQRALALFGGEKERLTPYFRQMNLTGGNNPHFPLEHETRWE HTNILSFYRSYLARKAFLEIRIGRSDRVENC PFLLLKEPKTDROTTLVAG WKDEFHLPRGIFTEAVRDC LIEMGYDEVGSYREVGFMAKAVPLYFE RACEDRVQPFYDSPFN VGNSLKP KGRFLSKEDRAEEWERMERF RDLEAWSHSAARRIKDAFAGIEYASPGNKKKIEQLLRDLSLWEAFES KLKVRADKINLAKLKEILEAQEHYPYHDFKSWQKFERELRLVKNQDII TWMMCRDLMEENKVEGLDTGTLYLKDIRPNVQE QGSLNVLNRVK PMRLPVVVYRADSRGHVHKEAPLATVYIEERN TKLLKQGNFKSFVK DRRLNGLFSFVDTGGLAMEQYPI SKLRVEYELAKYQTARVCFELTL RLEESLLSRYPHLPDES FREMLESWSDPLLAKWPELHGKVRLLIAVR NAFSHNQYPMYDEAVFSSIRKYDPSSPDAIEERMGLNIAHRLSEEVK QAKETVERIIQA
236	Cas13	MEKPLPPNVYTLKHKFFWGAFLNIARHNAFITICHINEQLGLTTPPN DDKIADVCGTWNINLNDHDLKKSQLTE LILKHFPFLAAMCYHP PKKEGKKKGSQKEQKEKENEASQA EALNPSELIKALKTLVKQLRT LRNYYSHYKHKKPD AEKDIFKHLYKAFDASLRMVKEDYKAHFTVNLT QDFAHLNRKGKNKQDNPKFD RYRFEKDGFFTESGLLFTNLFLDKR DAYWMLKKVSGFKASHKQSEKMTTEVFCSRILLPKLRLESRYDHN QMLLDMLSELSRCPKLLYEKLSEKDKKH FQVEADGFLDEIEEEQNPF KDALIRHQDRFPYFALRYLDL NESFKSIRFQVDLGTYHYCIYDKKIGDE

		QEKRLHTRTLLSFGRLQDFTEINRPQEWKALTKDLDYKETSQPFISK TTPHYHITDNKIGFRLGTSKELYPSEVKDGANRIAKYPYNSDFVAHA FISVHELLPLMFYQHLTGSSEDLLKETVRHIQRIYKDFEEERINTIEDLE KANQGRPLGAFPKQMLGLLQNKQPDSEKAKIKIEKLIETKLLSHR LNTKLKSSPKLGRREKLIKTDGWLVKDFMRFPVAYDVQNQPIESS KANSTEFQLIQRALALYGGEKNRLEGYFKQTNLIGNTNPHFPFLNKF WKACRNLDVDFYQQYLEQREKFLEAIKNQPWEPYQYCLLLKIPKENR KNLVKGWEQGGISLPRGLFTEAIRETSEDLTLSKPIRKEIKKHGRVGF ISRAITLYFRERYQDDHQSFYNLPYELEAKASTPKPPLPKKREYVLR HYEYWQQNKQPSTELQRLHTSDRWKDYLLYKRWQHLEKKLR YRNQDVMLWLMTLELTKNHFKELKNYHQLKENLAVNVQEADAK LNPLNQTLPMVLPVKVYPATAFGEVQYQETPIRTVYIREEQTKALKM GNFKALVKDRRLNGLFSFIKEENDTQKHPISQLRLRRELEIYQSLRVD AFKETLSLEEKLLNKHASLSSENEFRTLLEEWKKKYAASSMVTDEHI AFIASVRNAFCHNQYPFYKETLHAPIPLFTVAQPTTEEKDGLGIAEALL RVLREYCEIVKSQI
237	Cas13	MEKPLLPNVYTLKHKFFWGAFLNIARHNAFITCHINEQLGLKTPSN DDKIVDVVCETWNNILNNDHDLKKSQLTEILKHPFLTAMCYHPP KKEGKKKGHQKEQQKEKESEAQSQAELNPSKLIETLILVNQLHSL RNYYSHYKHKKPDAEKDIFKHLYKAFDASLRMVKEDYKAHFTVNLTR DFAHLNRKGKKNQDNPDFNRYRFEKDGFFTESGLLFFTNLFLDKRD AYWMLKKVSGFKASHKQREKMTTEVFCSRILLPKLRLESRYDHNQ MLLDMSELSCPKLLYEKLSEENKKHFQVEADGFLDEIEEEQNPFK DTLIRHQDRFPYFALRYDLNESFKSIRFQVDLGTYHYCIYDKKIGDEQ EKRHLHTRTLLSFGRLQDFTEINRPQEWKALTKDLDYKETSQPFISK TTPHYHITDNKIGFRLGTSKELYPSEIKDGANRIAKYPYNSGFVAHA FISVHELLPLMFYQHLTGSSEDLLKETVRHIQRIYKDFEEERINTIEDLE KANQGRPLGAFPKQMLGLLQNKQPDSEKAKIKIEKLIETKLLSHRL LNTKLKSSPKLGRREKLIKTDGVLADWLVKDFMRFPVAYDAQNQPI KSSKANSTEFWFIRRALALYGGEKNRLEGYFKQTNLIGNTNPHFPFLN KFNWKACRNLDVDFYQQYLEQREKFLEAIKNQPWEPYQYCLLLKIPKE NRKNLVKGWEQGGISLPRGLFTEAIRETSEDLMLSKPIRKEIKKHGR VGFISRAITLYFKEKYQDKHQSFYNLSYKLEAKAPLLKREEHYEYWQQ NKQPSTESQRLELHTSDRWKDYLLYKRWQHLEKKLRLYRNQDVM LWLMTLELTKNHFKELKNYHQLKENLAVNVQEADAKLNPLNQTL PMVLPVKVYPATAFGEVQYHKTPIRTVYIREEHTKALKMGNFKALVK DRRLNGLFSFIKEENDTQKHPISQLRLRRELEIYQSLRVD AFKETLSLEEKLLNKHTSLSENEFRALLEEWKKEYAASSMVTDEHIAFIASVRNAF CHNQYPFYKEALHAPIPLFTVAQPTTEEKDGLGIAEALLKVLREYCEIV KSQI

238	Cas13	MENKTSLGNNIYYNPFKPQDKSYFAGYFNAAMENTDSVFRELGKRL KGKEYTSENFDDAIFKENISLVEYERYVKLLSDYFPMARLLDKKEVPIK ERKENFKKNFKGIIKAVRDLRNFYTHKEHGEVEITDEIFGVLDDEMLKS TVLTVKKKKVKTDKTEILKKSIEKQLDILCQKKLEYLRDTARKIEEKRR NQRERGEKELVAPFKYSDDRDLIAAIYNDAFDVYIDKKKDSLKESSK AKYNTKSDPQQEEGDLKIPISKNGVVFLSLFLTKQEIHAFKSKIAGFK ATVIDEATVSEATVSHGKNSICFMATHEIFSHLAYKKLKRKVRTAEIN YGEAENAEQLSVYAKETLMMQMLDELSKVPDVVYQNLSEDVQKTF IEDWNEYLKENNGDVGTMEEEQVIHPVIRKRYEDKFNYFAIRFLDEF AQFPTLRFQVHLGNYLHDSRPKENLISDRRIKEKITVFGRLSELEHKKA LFIKNTETNEDREHYWEIFPNPNYDFPKENISVNDKDFPIAGSILDRE KQPVAGKIGIKVKLLNQYVSEVDKAVKAHQLKQRKASKPSIQNIIEE IVPINESNPKEAIVFGGQPTAYLSMNDIHSILYEFFDKWEKKKEKLEK KGEKELRKEIGKELEKKIVGKIQAQIQQIIDKDTNAKILKPYQDGNSTA IDKEKLIKDLKQEQNILQKLKDEQTVREKEYNDFIAYQDKNREINKVR DRNHKQYLKDNLKRKYPEAPARKEVLYYREKGVAVWLANDIKRF MPTDFKNEWKGEQHSLQKSLAYYEQCKEELKNLLPEKVFQHLPEK LGGYFQKQYLYQFYTCYLDKRLEYISGLVQQAENFKSENKVFKKVEN ECFKFLKKQNYTHKELDARVQSILGYPIFLERGFMDKPTIIGKTKFG NEALFADWFRYYKEYQNFQTFYDTENYPLVELEKKQADRKRKTKIYQ QKKNDVFTLLMAKHIFKSVFKQDSIDQFSLEDLYQSREERLGNQERA RQTGERNTNYIWNKTVDLKLCDGKITVENVKLKNVGDIFIKEYDQR VQAFLKYEENIEWQAFLIKESKEEENYPYVVERIEQYKVRREELLKE VHLIEEYILEKVKDKIELKKGDNQNFYYILNGLLQKLKQKNEVESYKVF NLNTEPEDVNINQLKQEATDLEQKAFVLTYIRNKFAHNQLPKKEFW DYCQEKYKGIEKEKTYAEYFAEVFKKEKEALIK
239	Cas13	MFFSFHNAQRVIFKHLYKAFDASLRMVKEDYKAHFTVNLTRDFAHL NRKGKNKQDNPDFNRYRFEKDGFFTESGLLFFTNLFLDKRDAYWM LKKVSGFKASHKQREKMTTEVFCRSRILLPKLRLESRYDHNQMLLD MLSELSRCPKLLYEKLSEENKKHFQVEADGFLDEIEEQNPFKDTLIR HQDRFPYFALRYLDLNEFSKIRFQVDLGTYHYCIYDKKIGDEQEKRH LTRTLLSFGRLQDFTEINRPQEWKALTKDLDYKETSNOFPISKTTPHY HITDNKIGFRLGTSKELYPSEIKDGANRIAKYPYNSGFVAHAFISVHE LLPLMFYQHLTGKSEDLKKTVRHIQRIYKDFEERINTIEDLEKANQG RLPLGAFPKQMLGLLQNKQPDLEKAKIKIEKLIATKLLSHRLNTKLK SSPKLGKRREKLIKTVGLADWLKDFMRFPVAYDAQNQPIKSSKA

		NSTEFWFIRRALALYGGEKNRLEGYFKQTNLIGNTNPHPFNLKFNW KACRNLDVDFYQQYLEQREKFLEAIKNQPWEPYQYCLLLKIPKENRKN LVKGWEQGGISLPRGLFTEAIRETSEDLMLSKPIRKEIKKHGRVGFIS RAITLYFKEKYQDKHQSFYNLSYKLEAKAPLLKREEHYEYWQQNKPQ SPTESQRLELHTSDRWKDYLLYKRWQHLEKKLRLYRNQDVMLWLM TLELTKNHFKELNLYHQLKENLAVNVQEADAKLNPLNQTLPMVL PVKVYPATAFGEVQYHKTPIRTVYIREEHTKALKMGNFKALVKDRRL NGLFSFIKEENDTQKHPISQLRLRRELEIYQSLRVDAFKETLSLEEKLLN KHTSLSSLENEFRALLEEWKKEYAASSMVTDEHIAFIASVRNAFCHN QYPFYKEALHAPIPLFTVAQPTTEEKDGLGIAEALLKVLREYCEIVKSQI
240	Cas13	MEKPLLPNVYTLKHKFFWGAFLNIARHNAFITICHINEQLGLKTPSN DDKIVDVV CETWNNILNNDHDLKKSQTEILKHFPLTAMCYHPP KKEGKKKGHQKEQQKEKESEAQSQAELNPSKLEALEILVNQLHSL RNYYSHYKHKKPD AEKDIFKHLYKAFDASLRMVKEDYKAHFTVNLTR DFAHLNRKGKKNQDNPDFNRYRFEKDGFFTESGLLFFTNLFLDKRD AYWMLKKVSGFKASHKQREKMTTEVFCSRILLPKLRLESRYDHNQ MLLDMLSELSRCPKLLYEKLSEENKKHFQVEADGFLDEIEEEQNPFK DTLIRHQDRFPYFALRYLDLNEFSKIRFQVDLGTYHYCIYDKKIGDEQ EKRHLTRTLLSFGRLQDFTEINRPQEWKALTKDLDYKETSNPFIKT TPHYHITDNKIGFRLGTSKELYPSEIKDGANRIAKYPYNSGFVAHAFI SVHELLPLMFYQHLTGKSEDLLKETVRHIQRIYKDFEEERINTIEDLEK ANQGRPLPGAFPKQMLGLLQNKQPD LSEKAKIKIEKLAETKLLSHRL NTKLKSSPKLGKRREKLIKTVGLADWLVKDFMRFPQPVAYDAQNQPI KSSKANSTEFWFIRRALALYGGEKNRLEGYFKQTNLIGNTNPHPFNL KFNWKACRNLDVDFYQQYLEQREKFLEAIKNQPWEPYQYCLLLKIPKE NRKNLVKGWEQGGISLPRGLFTEAIRETSEDLMLSKPIRKEIKKHGR VGFISRAITLYFKEKYQDKHQSFYNLSYKLEAKAPLLKREEHYEYWQQ NKPQSPTESQRLELHTSDRWKDYLLYKRWQHLEKKLRLYRNQDVM LWLMTLELTKNHFKELNLYHQLKENLAVNVQEADAKLNPLNQTL PMVLPVKVYPATAFGEVQYHKTPIRTVYIREEHTKALKMGNFKALVK DRRLNGLFSFIKEENDTQKHPISQLRLRRELEIYQSLRVDAFKETLSLEE KLLNKHTSLSSLENEFRALLEEWKKEYAASSMVTDEHIAFIASVRNAF CHNQYPFYKEALHAPIPLFTVAQPTTEEKDGLGIAEALLKVLREYCEIV KSQI
241	Cas13	MEKPLPPNVYTLKHKFFWGAFLNIARHNAFITICHINEQLGLTTPPN DDKIADVCGTWNNILNNDHDLKKSQTEILKHFPLAAMCYHP PKKEGKKKGSKQKEQQKEKENEASQAELNPSELKALKTLVKQLRT

		LRNYSHYKHKKPDAEKDIFKHLYKAFDASLRMVKEDYKAHFTVNL QDFAHLNRKGKKNQDNPKFDRYRFEKDGFFTESGLLFFTNLFLDKR DAYWMLKKVSGFKASHKQSEKMTTEVFCSRILLPKLRLESRYDHN QMLLDMLSELSRCPKLLYEKLSEKDKKHQVEADGFLDEIEEEQNPF KDALIRHQDRFPYFALRYLDLNEFSKSIRFQVDLGTYHYCIYDKKIGDE QEKRLTRTLLSFGRLQDFTEINRPQEWKALT KDLDYKETSQPFISK TTPHYHITDNKIGFRLGTSKELYSLEVKGANRIAKYPYNSDFVAHA FISVHELLPLMFYQHLT GKSEDLLKETVRHIQRIYKDFEEERINTIEDLE KANQGRPLGAFPKQMLGLLQNKQPD LSEKAKIKIEKIAETKLLSHR LNTKLKSSPKLGKRREKLIK TGVLADWLKDFMRFPVAYDVQNQP IESSKANSTEFQLIQRALALYGGEKNRLEGYFKQTNLIGNTNPHPFLN KFNWKACRNLVDFYQQYLEQREKFLEAIKNQPWEPYQYCLLLKIPKE NRKNLVKGWEQGGISLPRGLFTEAIRET LSEDLTLSKPIRKEIKKHGRV GFISRAITLYFRERYQDDHQSFYNLPYELEAKASTPKPPLPKREYVLR AEHYEYWQQNKQSPTELQRLEHTSDRWKDYLLYKRWQHLEKKL RLYRNQDVMLWMLTLELTKNHFKELKLNHYQLKENLAVNVQEAD AKLNPLNQTLPMLVPVKVYPATAFGEVQYQETPIRTVYIREEQTKAL KMGNFKALVKDRRLNGLFSFIKEENDTQKHPISQLRLRRELEIYQSLR VDAFKETLSLEKLLNKHASLSLENEFRTLLEE WKKKYAASSMVTDE HIAFIASVRNAFCHNQYPFYKETLHAPILLFTVAQPTTEEKDGLGIAEA LLRVLREYCEIVKSI
242	Cas13	MEKPLLPNVYTLKHKFFWGAFLNIARHNAFITCHINEQLGLKTPSN DDKIVDVVCETWNNILNNDHDLKKSQLTELILKHFPFLTAMCYHPP KKEGKKKGHQQEQQEKESEASQA EALNPSKLEALEILVNQLHSL RNYSHYKHKKPDAEKDIFKHLYKAFDASLRMVKEDYKAHFTVNLTR DFAHLNRKGKKNQDNPDFNRYRFEKDGFFTESGLLFFTNLFLDKRD AYWMLKKVSGFKASHKQREKMTTEVFCSRILLPKLRLESRYDHNQ MLLDMLSELSRCPKLLYEKLSEENKKHFQVEADGFLDEIEEEQNPFK DTLIRHQDRFPYFALRYLDLNEFSKSIRFQVDLGTYHYCIYDKKIGDEQ EKRHLTRTLLSFGRLQDFTEINRPQEWKALT KDLDYKETSQPFISKT TPHYHITDNKIGFRLGTSKELYSLEIKGANRIAKYPYNSGFAHAFI SVHELLPLMFYQHLT GKSEDLLKETVRHIQRIYKDFEEERINTIEDLEK ANQGRPLGAFPKQMLGLLQNKQPD LSEKAKIKIEKIAETKLLSHRL NTKLKSSPKLGKRREKLIK TGVLADWLKDFMRFPVAYDAQNQPI KSSKANSTEFWFIRRALALYGGEKNRLEGYFKQTNLIGNTNPHPFLN KFNWKACRNLVDFYQQYLEQREKFLEAIKNQPWEPYQYCLLLKIPKE NRKNLVKGWEQGGISLPRGLFTEAIRET LSEDMLSKPIRKEIKKHGR VGFISRAITLYFKEYQDKHQSFYNLSYKLEAKAPLLKREEHYEYWQQ NKQSPTESQRLEHTSDRWKDYLLYKRWQHLEKKLRLYRNQDVM LWMLTLELTKNHFKELNLYHQLKENLAVNVQEADAKLNPLNQT

		PMVLPVKVYPATAFGEVQYHKTPIRTVYIREEHTKALKMGNFKALVK DRRLNGLFSFIKEENDTQKHPISQLRLRRELEIYQSLRVD AFKETLSLEE KLLNKHTSLSSLENEFRALLEEWKKEYAASSMVTDEHIAFIASVRNAF CHNQYPFYKEALHAPIPLFTVAQPTTEEKDGLGIAEALLKVLREYCEIV KSQI
243	Cas13	MEKPLLPNVYTLKHKFFWGAFLNIARHNAFITICHINEQLGLKTPSN DDKIVDVVCETWNNILNNDHDLKKSQLTELILKHFPLTAMCYHPP KKEGKKKGHQKEQQKEKESEAQSQAELNPSKLEALEILVNQLHSL RNYSSHYYKHKKPDAEKDIFKHLYKAFDASLRMVKEDYKAHFTVNLTR DFAHLNRKGKKNQDNPDFNRYRFEKDGFFTESGLLFFTNLFLDKRD AYWMLKKVSGFKASHKQREKMTTEVFCSRILLPKLRLESRYDHNQ MLLDMSELSESRCPKLLYEKLSEENKKHFQVEADGFLDEIEEEQNPFK DTLIRHQDRFPYFALRYLDLNESEKSFQVLDLGTYHYCIYDKKIGDEQ EKRHLTRTLLSFGRLQDFTENRPQEWKALTKDLDYKETSNPFIKT TPHYHITDNKIGFRLGTSKELYPSEIKDGANRIAKYPYNSGFVAHAFA SVHELLPLMFYQHLTGSSEDLKETVRHIQRIYKDFEERINTIEDLEK ANQGRPLPGAFFPKQMLGLLQNKQPDSEKAKIKIEKLAETKLLSHRL NTKLKSSPKLGRREKLIKTVGLADWLVKDFMRFPQVAYDAQNQPI KSSKANSTEFWFIRRALALYGGEKNRLEGYFKQTNLIGNTNPHPFLN KFNWKACRNLDVDFYQQYLEQREKFLEAIKNQPWEPYQYCLLLKIPKE NRKNLVKGWEQGGISLPRGLFTEAIRETSEDMLSKPIRKEIKKHGR VGFISRAITLYFKEKYQDKHQSFYNLSYKLEAKAPLLKREEHYEYWQQ NKPQSPTESQRLELHTSDRWKDYLLYKRWQHLEKKLRLYRNQDVM LWLMTELTKNHFKELNLNYHQLKENLAVNVQEADAKLNPLNQTL PMVLPVKVYPATAFGEVQYHKTPIRTVYIREEHTKALKMGNFKALVK DRRLNGLFSFIKEENDTQKHPISQLRLRRELEIYQSLRVD AFKETLSLEE KLLNKHTSLSSLENEFRALLEEWKKEYAASSMVTDEHIAFIASVRNAF CHNQYPFYKEALHAPIPLFTVAQPTTEEKDGLGIAEALLKVLREYCEIV KSQI
244	Cas13	MEKPLLPNVYTLKHKFFWGAFLNIARHNAFITICHINEQLGLKTPSN DDKIVDVVCETWNNILNNDHDLKKSQLTELILKHFPLTAMCYHPP KKEGKKKGHQKEQQKEKESEAQSQAELNPSKLEALEILVNQLHSL RNYSSHYYKHKKPDAEKDIFKHLYKAFDASLRMVKEDYKAHFTVNLTR DFAHLNRKGKKNQDNPDFNRYRFEKDGFFTESGLLFFTNLFLDKRD AYWMLKKVSGFKASHKQREKMTTEVFCSRILLPKLRLESRYDHNQ MLLDMSELSESRCPKLLYEKLSEENKKHFQVEADGFLDEIEEEQNPFK DTLIRHQDRFPYFALRYLDLNESEKSFQVLDLGTYHYCIYDKKIGDEQ

		EKRHLTRTLLSFGRLQDFTEINRPQEWKALTKDLDYKETSNOFPISK TPHYHITDNKIGFRLGTSKELYPSEIKDGANRIAKYPYNSGFVAHA SVHELLPLMFYQHLTGKSEDLLKETVRHIQRIYKDFEERINTIEDLE ANQGRPLPLGAFPKQMLGLLQNKQPDSEKAKIKIEKLAETKLLSHRL NTKLKSSPKLGKRREKLIKTVGLADWLVKDFMRFPVAYDAQNQPI KSSKANSTEFWFIRRALALYGGEKNRLEGYFKQTNLIGNTNPHFLN KFNWKACRNLVDFYQQYLEQREKFLEAIKNQPWEPYQYCLLLKIPKE NRKNLVKGWEQGGISLPRGLFTEAIRETSEDLMLSKPIRKEIKKHGR VGFISRAITLYFKEKYQDKHQSFYNLSYKLEAKAPLLKREEHYEYWQQ NKPQSPTESQRLELHTSDRWKDYLLYKRWQHLEKKLRLYRNQDVM LWLMTELTKNHFKELNLNYHQLKENLAVNVQEADAKLNPLNQTL PMVLPVKVYPATAFGEVQYHKTPIRTVYIREEHTKALKMGNFKALVK DRRLNGLFSFIKEENDTQKHPISQLRLRRELEIYQSLRVDAFKETLSLE KLLNKHTSLSSLENEFRALLEEWKKEYAASSMVTDEHIAFIASVRNAF CHNQYPFYKEALHAPIPLFTVAQPTTEEKDGLGIAEALLKVLREYCEIV KSQI
245	Cas13	MFFSFHNAQRVIFKHLYKAFDASLRMVKEDYKAHFTVNLTRDFAHL NRKGKNKQDNPDFNRYRFEKDGFFTESGLLFFTNLFLDKRDAYWM LKKVSGFKASHKQREKMTTEVFCSRILLPKLRLESRYDHNQMLLD MLSELSRCPKLLYEKLSEENKKHFQVEADGFLDEIEEQNPFKDTLIR HQDRFPYFALRYDLNESFKSIRFQVDLGTYHYCIYDKKIGDEQEKRH LTRTLLSFGRLQDFTEINRPQEWKALTKDLDYKETSNOFPISKTPHY HITDNKIGFRLGTSKELYPSEIKDGANRIAKYPYNSGFVAHAHAFISVHE LLPLMFYQHLTGKSEDLLKETVRHIQRIYKDFEERINTIEDLEKANQG RLPLGAFPKQMLGLLQNKQPDSEKAKIKIEKLAETKLLSHRLNTKLK SSPKLGKRREKLIKTVGLADWLVKDFMRFPVAYDAQNQPIKSSKA NSTEFWFIRRALALYGGEKNRLEGYFKQTNLIGNTNPHFLNKFNW KACRNLVDFYQQYLEQREKFLEAIKNQPWEPYQYCLLLKIPKENRKN LVKGWEQGGISLPRGLFTEAIRETSEDLMLSKPIRKEIKKHGRVGFIS RAITLYFKEKYQDKHQSFYNLSYKLEAKAPLLKREEHYEYWQQNKPQ SPTESQRLELHTSDRWKDYLLYKRWQHLEKKLRLYRNQDVMLWLM TELTKNHFKELNLNYHQLKENLAVNVQEADAKLNPLNQTLPMVL PVKVYPATAFGEVQYHKTPIRTVYIREEHTKALKMGNFKALVKDRRL NGLFSFIKEENDTQKHPISQLRLRRELEIYQSLRVDAFKETLSLEEKLN KHTSLSSLENEFRALLEEWKKEYAASSMVTDEHIAFIASVRNAFCHN QYPFYKEALHAPIPLFTVAQPTTEEKDGLGIAEALLKVLREYCEIVKSQI

246	Cas13	MDTPNFSERIPVSLQSHPYFAHYLNMARHNAYVILEYVNRELKPG KNLDEDNLIQSTVLKDG YFDRKPDEL SHRNRLLVQHFPFLREAENEG ARTCNPVSYKLKTALAALNQWRNNASHYPLNQNHKDFDLQPFES FAIEACKRMREVFQPDFFYLLETNEKQFYTLHNENGFTKGLYCFIC FFLEKKYAFQFLAGIKGFKNTTDNKFRALETTEHCCRLPKPKLDS DIKLDMLGELSRCPAPLFDLLDIEERKKFIREPEEVKPDSESGDREEVQ QVLMKRYDDRFPYFALRYFEEKNLLKGISFHHIGRWIKSEHTKKIMG AERDRRLKDIRTFGELKEFSPEHAPDYWLRDGITPDDVDQFSPQYR IVGNRIGIKLNYNGHNRSVPDKEINVKPDIIISTEYFLNLFYEHLY QKKLTGLSPAEFIQDYLD RFNNFLSEFKAGHIRPVGDFSLEKRRGQG DEPDLTARRKSLQKELDRFVLKGKDLDPDKIREYLLGYKQKSEKKQAK WILGGMKETVYWRNKAEQSPEKMRSGDMAQQLARDIIFLT PPH VKEHKQKLNLEYDVLQYALAYFSSNREKLYSFFKEHQLTVKGDRAH PFLYKIRLDECQGILDFFIVYMQQKEKWLGWLDRLNLSRPLNEEEFF NTYSYFIKTDTKRAIEMDYESCPNYLPRGIFNEPIAKALQKAGVKIKDE DNASYALSVYSNGKTQPFYNKERYNKGIFRMEELPEKLQPKELLGKI QWTIKSSGKDTEEFRSLQNLKNRILNTEKEIRYVQSTDRLWIMVAD LFPETFELRPDDLECIHDLSDLLSRPYQMKEKVNYTITDYLPIKRY GEFRRFLKDRRLNLLTYFEEGVPLHREALVAELEAYDLQRKNLLEIY RFEKLVFDRHRHELTFSGEGENQYVNHWDYLD FVARKYGLSAEVKE LNSERFTEL RNKMLHNQIPYQLWIKAEIAAREENTVCGRIMGMIGE YERMTTEIEKQMQV
247	Cas13	MTEQNEKPYNGTYTLEDKHFWA AFLNLARHNAYITLTHIDRQLAY SKADITNDEDILFFKGQWKNLDNDLERKARLSLILKHFFLEGAAYG KKLFESQSSGNKSSKKKELTKKEKEELQANALSLDNLKSILFDLQKLK DFRNYYSHYRHPESELPLFDGNMLQRLYNVFDVSVQRVKRDHEH NDKVDPHRHFHNLVRKGKKDKYGNNDNPFKHHFVDREGKVTEA GLLFFVSLFLEKRDAIWMQKKIRGFKGGTETYQQMTNEVFCSRISL PKLKLESRLTDDWMLLDMLNELVRCPSLYDRLREEDRARFRVPVDI LSDEDDTDGAEDDPFKNTLVRHQDRFPYFALRYFDLKKVFTSLRFHID LGTYHFAIYKKNIGE QPEDRH LTRNLYGFGRIQDFAEEHRPEEWKRL VRDLDYFETGDKPYITQTTPHYHIEKGKIGLRFVPEGQHLWPSPEVG ATRTGRSKYAQDKRFTA EAFLSVHELMPMMFYFLLREKYSEEASAE RVQGRIKRVIEDVYAVYDAFARDEINTRDELDA CLADKGIRRGHLPR QMIAILSQKHKDMEEKVRKKLQEMIADTDHRLDMLDRQTD RKIRIG RKNAGLPKSGVIADWLVRDMMRFQPVAKDTSGKPLNNSKANSTE YRMLQRALALFGGEKERLTPYFRQMNL TGGNPHFPHLHETR WESH TNILSFYRSYLKARKAFLOSIGRSDRVENHRFLLLKEPKTDROTLVAG WKGEFHLPRGIFTEAVRDCLIEMGLDEVRSYKEVGFM AKAVPLYFE RASKDRVQPFYDYPFNVGNSLKP KGRFLSKEKRAEEWESGKERFR

		DLEAWSHSAARRIEDAFAGIENASRENKKKIEQLLQDLSLWETFESKL KVKADKINIAKLKKEILEAKEHPYLDKFSWQKFERELRLVKNQDIITW MMCRDLMEENKVEGLDTGTLYLKDIRTDVQEQQSLNVLNHVKPM RLPVVVYRADSRGHVHKEQAPLATVYIEERDTKLLKQGNFKFSVKDR RLNGLFSFVDTGGLAMEQYPISKLRVEYELAKYQTARVCAFEQTLLE ESLLTRYPHLPDKNFRKMLESWSDPLLAKWPELHEKVRLIAVRNAF SHNQYPMYDEAVFSPIRKYDPSSPDAIEERMRLNIAHRLSEEVKQAK ETVERIIQA
248	Cas13	MDTPNFSERIPVSLQSHPYFAHYLNMARHNAYVILEYVNRELKPG KNLDEDNLIQSTVLKDGYPDRKPDELSHRNRLLVQHFPFLREAENEG ARTCNPVSYKLKTALAALNQWRNNASHYPLNQNHKDFDLQPPFS FAIEACKKRMREVFQPDDEFYLETNEKQFYTLHNENGFTTEGLYCFIC FFLEKKYAFQFLAGIKGFKNTTNDKFRATLETTEHCCRLPKPKLDSS DIKLDMLGELSRCAPLFDLLDIEERKKFIREPEEVKPDSESGDREEVQ QVLMKRYDDRFYPYFALRYFEEKNLLKGISFHHIGRWIKSEHTKKIMG AERDRRLKDIRTFGELKEFSPEHAPDYWLRDITPDDVDQFSPQYR IVGNRIGIKLNYNGHNRWSPDKINVKPDIIISTYEFNLFLYEHLY QKKLTGLSPAEFIQDYLDRFNNFLSEFKAGHIRPVGDFSLEKRRGQG DEPDLTARRKSLQKELDRFVLKGKDLDPKIREYLLGYKQKSEKKQAK WILGGMKETVYWRNKAESPEKMRSGDMAQQLARDIIFLTTPPHT VKEHKQKLSLEYDVLQYALAYFSSNREKLYSFFKEHQTLVKGDRAH PFLYKIRLDECQGILDFFIVYMQQKEKWLGWLDRLNKSRLNEEEFF NTYSYFIKTDTKRAIEMDYESCPLYLPRGIFNEPIAKALQKAGVKKDE DNASYALSVYSNGKTQPFYNKERYYNKGIFRMEELPEKLQPKELGKI QWTIKSSGKDTEEFRSLQNLKNRILNTEKEIRYVQSTDRLWIMVAD LPETFELRPDDLECIGHDLSDDLSPYQMKKEKVNYTITDYLPIKRY GEFRRFLKDRRLNLLTYFEEGVPLHREALVAELEAYDLQRKNLLEIY RFEKLVFDRHRHELTFSGEGENQYVNHWDYLDVFARKYGLSAEVKE LNSERFTELNRKMLHNQIPYQLWIKAEIAAREENTVCGRIMGMIGE YERMTTEIEKQMQV
249	Cas13	MGAIENTKHIFAAAYANLAIDGLIKTLNFIKKLDTQKQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYYHDPICYPGGYDIPSSLNCIYDSAINIIE RFQAEKEMEHLRRYTRKKGRVVLKTEDDHFYTLANNNDLSEKGY AFFISMFLERKYSYFLKKLSGFKRGDSLQYRLTLEVFTALSTKPPVERL RTTKDTKQDRALDILNELSRPIELYQTLEPKYREMYNATLQPTDAED PYGLPDRSRIRFRSRFEAFALHFLDKQADFKEIGFYTYLGNFYHNGYQ

		KTRVDRETKDRYINFQLAGFCKNIQDISAKKLSEALNVKSIDISTDSIP DINSFEPYLVQSTPHYIVNGNNIGIKVLPEGKDTYPTIDEKGAKMPIA DFWLSKYELPAMLFYTYLRNNNIHKSHCPLSVKDIERSIHKSTKQKH PEERSELMRRVMKAIFWTDKLNVERIKSQKSAFGKRQHEILKAG RIAETLVRDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRRNDL TEIFTRAGLINSSNPHFLAQIGTNYTSLIEFYIAYLKERKVYFSRIQKKI LQGKLNQCHPLRDLQREPKNPQKEEAIFLPRGLFNEAIINCLKSKSL KQLIESPTREKSPALNVSYLILNYFRTYFEDQSQEFYAQPRNYRLFDKL SPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLLEKEDRLYRKNY NEICDNESIIRLYQIQDILLFMMTKEYLPDLYNRINKYKLENVKGILN ERSYILDLNPLKIQGEDIKIDYDGKLFYIHHDRINSLNKVLSKVKRN NSISSSVKIQPYENYKRECLDFEEAQIPIIHSFEIAMVSMFPLDKKA TPGNYYDFNELITEYEKRTKQKIDSSFLIKTRNMFHDKYEAECIKEIS DDFVYAKKIIAEFKMKIENIKLEDFSNDS
250	Cas13	MEKPLPPNVYTLKHKFFWGAFLNIARHNAFITICHINEQLGLTTPPN DDKIADVCGTWNNILNNDHDLKKSQLTEILKHFPLAAMCYHP PKKEGKKKGSQKEQKEKENEASQAEALNPSELKALKTLVKQLRT LRNYYSHYKHKKPDAEKDIFKHLYKAFDASLRMVKEDYKAHFTVNL QDFAHLNRKGKKNQDNPKFDYRFEKDGFFTESGLLFTNLFDR DAYWMLKKVSGFKASHKQSEKMTTEVFCSRILLPKLRLESRYDHN QMLLDMLSELSRCPKLLYEKLSEKDKKHQVEADGFLDEIEEQNPF KDALIRHQDRFPYFALRYDLNESFKSIRFQVDLGTYHYCIYDKIGDE QEKRLHTRTLTSFGRLQDFTEINRPQEWKALTKDLDYKETSQKPFISK TTPHYHITDNKIGFRLGTSKELYPSEVKDGANRIKYPYNSDFVAHA FISVHELLPLMFYQHLTGKSEDLKETVRHIQRIYKDFEERINTIEDLE KANQGRPLGAFPKQMLGLLQNKQPDSEKAKIKIEKIAETKLLSHR LNTKLKSSPKLGRREKLIKTVGLADWLKDFMRFPVAYDVQNQP IESSKANSTEFQLIQRALALYGGEKNRLEGYFKQTNLIGNTNPHPLN KFNWKACRNLVDFYQQYLEQREKFLEAIKNQPWEPYQYCLLLKIPKE NRKNLVKGWEQGGISLPRGLFTEAIRETLSEDLTLSKPIRKEIKKHGRV GFISRAITLYFRERYQDDHQSFYNLPYELEAKASTPKPPLPKKREYVLR AEHYEYWQQNKQSPTELQRELHTSDRWKDYLLYKRWQHLEKKL RLYRNQDVMLWMLTLELTKNHFKEKLNHQLKLENLAVNVQEAD AKLNPLNQTLPMVLPVKVYPATAFGEVQYQETPIRTVYIREEQTKAL KMGNFKALVKDRRLNGLFSFIKEENDTQKHPISQLRLRRELEIYQSLR VDAFKETLSLEKLLNKHASLSSENEFRTLLEEWKKKYAASSMVTDE HIAFIASVRNAFCHNQYPFYKETLHAPILLFTVAQPTTEEKDGLGIAEA LLRVLREYCEIVKSQI

251	Cas13	MEKPLLPNVYTLKHKFFWGAFLNIARHNAFITCHINEQLGLKTPSN DDKIVDVVCETWNNILNNDHDLKKSQLTELILKHFPFLTAMCYHPP KKEGKKKGHQKEQQKEKESEAQSQAELNPSKLEALEILVNQLHSL RNYSSHYYKHKKPDAEKDIFKHLYKAFDASLRMVKEDYKAHFTVNLTR DFAHLNRKGKKNQDNPDFNRYRFEKDGFFTESGLLFFTNLFLDKRD AYWMLKKVSGFKASHKQREKMTTEVFCSRILLPKLRLESRYDHNQ MLLDMLSELRCPKLLYEKLSEENKKHFQVEADGFLDEIEEEQNPFK DTLIRHQDRFPYFALRYDLNESFKSIRFQVDLGTYHYCIYDKKIGDEQ EKRLHTRTLLSFGRLQDFTEINRPQEWKALTKDL DYKETS NQPFISK T TPHYHITDNKIGFRLGTSKELYPSEIKDGANRIAKYPYNSGFVAHAFI SVHELLPLMFYQHLTGKSEDLLKETVRHIQRIYKDFEEERINTIEDLEK ANQGRLPLGAFPKQMLGLLQNKQPD LSEKAKIKIEK LIAETKLLSHRL NTKLKSSPKLGKRREKLIK TGVLADWL VKDFMRFPQVAYDAQNQPI KSSKANSTEFWFIRRALALYGGEKNRLEGYFKQTNLIGNTNPHPFLN KFNWKACRNLVDFYQQYLEQREKFLEAIKNQPWEPYQYCLLLKIPKE NRKNLVKGWEQGGISLPRGLFTEAIRET LSEDLMLSPIRKEIKKHGR VGFISRAITLYFKEKYQDKHQSFYNLSYKLEAKAPLLKREEHYEYWQQ NKPQSPTESQRLELHTSDRWKDYLLYKRWQHLEKKLRLYRNQDVM LWLMTELTKNHFKELNLYHQLKENLAVNVQEADAKLNPLNQTL PMVLPVKVYPATAFGEVQYHKTPIRTVYIREEHTKALKMGNFKALVK DRRLNGLFSFIKEENDTQKHPISQLRLRRELEIYQSLRVD AFKETLSLEE KLLNKHTSLSSLENEFRALLEEWKKEYAASSMVTDEHIAFIASVRNAF CHNQYPFYKEALHAPIPLFTVAQPTTEEKDGLGIAEALLKVLREYCEIV KSQI
252	Cas13	MEKPLLPNVYTLKHKFFWGAFLNIARHNAFITCHINEQLGLKTPSN DDKIVDVVCETWNNILNNDHDLKKSQLTELILKHFPFLTAMCYHPP KKEGKKKGHQKEQQKEKESEAQSQAELNPSKLEALEILVNQLHSL RNYSSHYYKHKKPDAEKDIFKHLYKAFDASLRMVKEDYKAHFTVNLTR DFAHLNRKGKKNQDNPDFNRYRFEKDGFFTESGLLFFTNLFLDKRD AYWMLKKVSGFKASHKQREKMTTEVFCSRILLPKLRLESRYDHNQ MLLDMLSELRCPKLLYEKLSEENKKHFQVEADGFLDEIEEEQNPFK DTLIRHQDRFPYFALRYDLNESFKSIRFQVDLGTYHYCIYDKKIGDEQ EKRLHTRTLLSFGRLQDFTEINRPQEWKALTKDL DYKETS NQPFISK T TPHYHITDNKIGFRLGTSKELYPSEIKDGANRIAKYPYNSGFVAHAFI SVHELLPLMFYQHLTGKSEDLLKETVRHIQRIYKDFEEERINTIEDLEK ANQGRLPLGAFPKQMLGLLQNKQPD LSEKAKIKIEK LIAETKLLSHRL NTKLKSSPKLGKRREKLIK TGVLADWL VKDFMRFPQVAYDAQNQPI KSSKANSTEFWFIRRALALYGGEKNRLEGYFKQTNLIGNTNPHPFLN

		KFNWKACRNLDVDFYQQYLEQREKFLEAIKNQPWEPYQYCLLLKIPKE NRKNLVKGWEQGGISLPRGLFTEAIRETLEDLMLSPIRKEIKKHGR VGFISRAITLYFKEKYQDKHQSFYNLSYKLEAKAPLLKREEHYEYWQQ NKPQSPTESQRLELHTSDRWKDYLLYKRWQHLEKKLRLYRNQDVM LWLMTELETKNHFKELNLNYHQLKENLAVNVQEADAKLNPLNQT PMVLPVKVYPATAFGEVQYHKTPIRTVYIREEHTKALKMGNFKALVK DRRLNGLFSFIKEENDTQKHPISQLRLRRELEIYQSLRVDAFKETLSLEE KLLNKHTSLSSLENEFRALLEEWKKEYAASSMVTDEHIAFIASVRNAF CHNQYPFYKEALHAPIPLFTVAQPTTEEKDGLGIAEALLKVLREYCEIV KSQI
253	Cas13	MFFSFHNAQRVIFKHLYKAFDASLRMVKEDYKAHFTVNLTRDFAHL NRKGKNKQDNPDFNRYRFEKDGFFTESGLLFFTNLFLDKRDAYWM LKKVSGFKASHKQREKMTTEVFCRSRILLPKLRLESRYDHNQMLLD MLSELSRCPKLLYEKLSEENKKHFQVEADGFLDEIEEEQNPFKDTLIR HQDRFPYFALRYLDLNEFSKIRFQVDLGTYHYCIYDKKIGDEQEKRH LTRTLLSFGRLQDFTENRPQEWKALTKDLDYKETSNOQPFISKTTPHY HITDNKIGFRLGTSKELYPSEIKDGANRIAKYPYNSGFVAHAFISVHE LLPLMFYQHLTGKSEDLKTVRHIQRIYKDFEERINTIEDLEKANQG RLPLGAFPKQMLGLLQNKQPDLEKAKIKIEKLAETKLLSHRLNTKLK SSPKLGKRREKLIKTVGLADWLKDFMRFPVAYDAQNQPIKSSKA NSTEFWFIRRALALYGGEKNRLEGYFKQTNLIGNTNPHFPLNKFNW KACRNLDVDFYQQYLEQREKFLEAIKNQPWEPYQYCLLLKIPKENRKN LVKGWEQGGISLPRGLFTEAIRETLEDLMLSPIRKEIKKHGRVGFIS RAITLYFKEKYQDKHQSFYNLSYKLEAKAPLLKREEHYEYWQQNKPQ SPTESQRLELHTSDRWKDYLLYKRWQHLEKKLRLYRNQDVMWLWM TLELETKNHFKELNLNYHQLKENLAVNVQEADAKLNPLNQTLPMLV PVKVPYATAFGEVQYHKTPIRTVYIREEHTKALKMGNFKALVKDRRL NGLFSFIKEENDTQKHPISQLRLRRELEIYQSLRVDAFKETLSLEEKLLN KHTSLSSLENEFRALLEEWKKEYAASSMVTDEHIAFIASVRNAFCHN QYPFYKEALHAPIPLFTVAQPTTEEKDGLGIAEALLKVLREYCEIVKSQI
254	Cas13	MEKPLLPNVYTLKHKFFWGAFLNIARHNAFITICHINEQLGLKTPSN DDKIVDVVCETWNNILNNDHDLKKSQLELILKHPFLTAMCYHPP KKEGKKKGHQKEQKEKESEAQSQAELNPSKLI EAILEILVNQLHSL RNYSHYKHKKPD AEKDIFKHLYKAFDASLRMVKEDYKAHFTVNLTR DFAHLNRKGKNKQDNPDFNRYRFEKDGFFTESGLLFFTNLFLDKRD AYWMLKKVSGFKASHKQREKMTTEVFCRSRILLPKLRLESRYDHNQ MLLDMLSELSRCPKLLYEKLSEENKKHFQVEADGFLDEIEEEQNPFK

		DTLIRHQDRFPYFALRYLDLNESEFKSIRFQVDLGTYHYCIYDKKIGDEQ EKRHLTRTLLSFGRLQDFTEINRPQEWKALTKDLDYKETSNOQPFISK TPHYHITDNKIGFRLGTSKELYPSEIKDGANRIAKYPYNSGFVAHAFA SVHELLPLMFYQHLTGKSEDLLKETVRHIQRIYKDFEERINTIEDLEK ANQGRPLPLGAFPKQMLGLLQNKQPDLEKAKIKIEKLAETKLLSHRL NTKLKSSPKLGKRREKLIKTVGLADWLVKDFMRFPQVAYDAQNQPI KSSKANSTEFWFIRRALALYGGEKNRLEGYFKQTNLIGNTNPHPFLN KFNWKACRNLVDFYQQYLEQREKFLEAIKNQPWEPYQYCLLLKIPKE NRKNLVKGWEQGGISLPRGLFTEAIRETLESDMLSKPIRKEIKKHGR VGFISRAITLYFKEKYQDKHQSFYNLSYKLEAKAPLLKREEHYEYWQQ NKPQSPTESQRLELHTSDRWKDYLLYKRWQHLEKKLRLYRNQDVM LWLMTLELTKNHFKELNLYHQLKENLAVNVQEADAKLNPLNQT PMVLPVKVYPATAFGEVQYHKTPIRTVYIREEHTKALKMGNFKALVK DRRNLGLFSFIKEENDTQKHPISQLRLRRELEIYQSLRVDFAKETLSLEE KLLNKHTSLSSLENEFRALLEEWKKEYAASSMVTDEHIAFIASVRNAF CHNQYPFYKEALHAPIPLFTVAQPTTEEKDGLGIAEALLKVLREYCEIV KSQI
255	Cas13	MEKPLLPNVYTLKHKFFWGAFLNIARHNAFITCHINEQLGLKTPSN DDKIVDVVCEWNNILNNDHDLKKSQLTELILKHPFLTAMCYHPP KKEGKKKGHQEQQKEKESEASQAEALNPSKLEALEILVNQLHSL RNYYSHYKHKKPDAEKDIFKHLYKAFDASLRMVKEDYKAHFTVNLTR DFAHLNRKGKKNQDNPDFNRYRFEKDGFFTESGLLFFTNLFLDKRD AYWMLKKVSGFKASHKQREKMTTEVFCSRILLPKLRLESRYDHNQ MLLDMLSELSRCPKLLYEKLSEENKKHFQVEADGFLDEIEEEQNPFK DTLIRHQDRFPYFALRYLDLNESEFKSIRFQVDLGTYHYCIYDKKIGDEQ EKRHLTRTLLSFGRLQDFTEINRPQEWKALTKDLDYKETSNOQPFISK TPHYHITDNKIGFRLGTSKELYPSEIKDGANRIAKYPYNSGFVAHAFA SVHELLPLMFYQHLTGKSEDLLKETVRHIQRIYKDFEERINTIEDLEK ANQGRPLPLGAFPKQMLGLLQNKQPDLEKAKIKIEKLAETKLLSHRL NTKLKSSPKLGKRREKLIKTVGLADWLVKDFMRFPQVAYDAQNQPI KSSKANSTEFWFIRRALALYGGEKNRLEGYFKQTNLIGNTNPHPFLN KFNWKACRNLVDFYQQYLEQREKFLEAIKNQPWEPYQYCLLLKIPKE NRKNLVKGWEQGGISLPRGLFTEAIRETLESDMLSKPIRKEIKKHGR VGFISRAITLYFKEKYQDKHQSFYNLSYKLEAKAPLLKREEHYEYWQQ NKPQSPTESQRLELHTSDRWKDYLLYKRWQHLEKKLRLYRNQDVM LWLMTLELTKNHFKELNLYHQLKENLAVNVQEADAKLNPLNQT PMVLPVKVYPATAFGEVQYHKTPIRTVYIREEHTKALKMGNFKALVK DRRNLGLFSFIKEENDTQKHPISQLRLRRELEIYQSLRVDFAKETLSLEE KLLNKHTSLSSLENEFRALLEEWKKEYAASSMVTDEHIAFIASVRNAF CHNQYPFYKEALHAPIPLFTVAQPTTEEKDGLGIAEALLKVLREYCEIV KSQI

256	Cas13	MEKPLLNVYTLKHKFFWGAFLNIARHNAFITCHINEQLGLKTPSN DDKIVDVV CETWNNILNNDHDLKKSQLTELILKHFPFLTAMCYHPP KKEGKKKGHQKEQQKEKESEAQSQAELNPSKLEALEILVNQLHSL RNYYSHYKHKKPD AEKDIFKHLYKAFDASLRMVKEDYKAHFTVNLTR DFAHLNRKGKKNQDNPDFNRYRFEKDGFFTESGLLFFTNLFLDKRD AYWMLKKVSGFKASHKQREKMTTEVFCSRILLPKLRLESRYDHNQ MLLDMSEL SRCPKLLYEKLSEENKKHFQVEADGFLDEIEEEQNPFK DTLIRHQDRFPYFALRYLDL NESFKSIRFQVDLGTYHYCIYDKKIGDEQ EKRLHTRTLLSFGRLQDFTEINRPQEWKALT KDLDYKETS NQPFISK TPHYHITDNKIGFRLGTSKELYSLEIKDGANRIAKYPYNSGFVAHAFI SVHELLPLMFYQH LTGKSEDLLKETVRHIQRIYKDFEEERINTIEDLEK ANQGRPLPGA FPKQMLG LLQNKQPD LSEKAKIKIEK LIAETKLLSHRL NTKLKSSPKLGKRREKLIK TGVLADWL VKDFMRFPQVAYDAQNQPI KSSKANSTEFWFIRRALALYGGEKNRLEGYFKQTNLIGNTNPHFPLN KFNWKACRNLVDFYQQYLEQREKFLEAIKNQPWEPYQYCLLLKIPKE NRKNLVKGWEQGGISLPRGLFTEAIRETSEDLMLSKPIRKEIKKHGR VGFISRAITLYFKEKYQDKHQSFYNLSYKLEAKAPLLKREEHYEYWQQ NKPQSPTESQRLELHTSDRWKDYLLYKRWQHLEKKLRLYRNQDVM LWLMTELTKNHFKELNLYHQLKENLAVNVQEADAKLNPLNQTL PMVLPVKVYPATAFGEVQYHKTPIRT VYIREEHTKALKMGNFKALVK DRRLNGLFSFIKEENDTQKHPISQLRLRRELIYQSLRVD AFKETLSLEE KLLNKHTSLSSLENEFRALLEEWKKEYAASSMVTDEHIAFIASVRNAF CHNQYPFYKEALHAPIPLFTVAQPTTEEKDGLGIAEALLKVLREYCEIV KSQI
257	Cas13	MDTPNFSERIPVSLQSHPYFAHYLNMARHNAYVILEYVNRELKPG KNLDEDNLIQSTVLKDG YFDRKPDEL SHRNRLLVQHFPFLREAENEG ARTCNPVSYKLKTALAA LNQWRNNASHYPLNQNH EKDFDLQPFES FAIEACKRMREVFQPD DFYLLETNEKQFYTLHNENG FTEKGLYCFIC FFLEKKYAFQFLAGIKGFKNTTDNKF RATLETFTTEHCCRLPKPKLDS DIKLDMLGELSRC PAPLFDLLDIEERKKFIREPEEVKPD ESGDREEVQ QVLMKRYDDRFYPYFALRYFEEKNLLKGISFHIHIGRWIKSEHTKKIMG AERDRRLKDIRTFGELKEFSPEHAPDYWLRDGITPDDVDQFSPQYR IVGNRIGIKLNYNGHN RWSVPDKEINVKPD AISTYEFLNLFYEHLY QKKLTGLSPAEFIQDYLD RFNNFLSEFKAGHIRPVGDFSLEKRRGQG DEPDLTARRKSLQKELDRFVLKGKDL PDKIREYLLGYKQKSEKKQAK WILGGMIKETVYWRNKA EQSPEKMRSGDMAQQLARDIIFLTPPHT VKEHKQKLNSLEYDVLQYALAYFSSNREKLYSFFKEHQLTVKGDRAH PFLYKIRLDECQGILDF FIVYMQQKEKWLGWLDRLNLSKPRLN EEEEE

		NTYSYFIKTDTKRAIEMDYESCPNYLPRGIFNEPIAKALQKAGVKIKDE DNASYALSVYSNGKTQPFYNKERYYNKGIFRMEELPEKLQPKELLGKI QWTIKSSGKDTTEFRSLQNLKNRILNTEKEIRYVQSTDRLWIMVAD LPETFELRPDDLEICIGHDLSDDLRSRYPYQMKVKVNYTITDYLPIKRY GEFRRFLKDRRLNLLTYFEEGVPLHREALVAELEAYDLQRKNLLEIY RFEKLVFDRHRHELTFSGEGENQYVNHWDYLDVFARKYGLSAEVKE LNSERFTELNRKMLHNQIPYQLWIKEAIAAREENTVCGRIMGMIGE YERMTTEIEKQMQV
258	Cas13	MFFSFHNAQRVIFKHLYKAFDASLRMVKEDYKAHFTVNLTRDFAHL NRKGKNKQDNPDFNRYRFEKDGFFTESGLLFFTNLFLDKRDAYWM LKKVSGFKASHKQREKMTTEVFCRSRILLPKLRLESRYDHNQMLLD MLSELSRCPKLLYEKLSEENKKHFQVEADGFLDEIEEEQNPFKDTLIR HQDRFPYFALRYLDLNEFSKSIRFQVDLGTYHYCIYDKKIGDEQEKRH LTRTLLSFGRLQDFTINRPQEWKALTKDLDYKETSNOQPFISKTTPHY HITDNKIGFRLGTSKELYPSLEIKDGANRIAKYPYNSGFVAHAFISVHE LLPLMFYQHLTGKSEDLKTVRHIQRIYKDFEERINTIEDLEKANQG RLPLGAFPKQMLGLLQNKQPDLSEKAKIKIEKLAETKLLSHRLNTKLK SSPKLGKRREKLIKTVLADWLKDFMRFQPVAYDAQNQPIKSSKA NSTEFWFIRRALALYGGEKNRLEGYFKQTNLIGNTPHPFLNKFNW KACRNLDVDFYQQYLEQREKFLEAIKNQPWEYQYCLLLKIPKENRKN LVKGWEQGGISLPRGLFTEAIRETLEDLMLSKPIRKEIKKHGRVGFIS RAITLYFKEKYQDKHQSFYNLSYKLEAKAPLLKREEHYEYWQQNKPO SPTESQRLELHTSDRWKDYLLYKRWQHLEKKLRLYRNQDVMLWLM TLELTKNHFKELNLNYHQLKENLAVNVQEADAKLNPLNQTLPMVL PVKVYPATAFGEVQYHKTPIRTVYIREEHTKALKMGNFKALVKDRRL NGLFSFIKEENDTQKHPISQLRLRRELEIYQSLRVDAFKETLSLEEKLLN KHTSLSSLENEFRALLEEWKKEYAASSMVTDEHIAFIASVRNAFCHN QYPFYKEALHAPIPLFTVAQPTTEEKDGLGIAEALLKVLREYCEIVKSQI
259	Cas13	MEKPLLPNVYTLKHKFFWGAFLNIARHNAFITICHINEQLGLKTPSN DDKIVDVVCETWNNILNNDHDLKKSQTEILKHFPLTAMCYHPP KKEGKKKGHQKEQKEKESEAQSQAELNPSKLEALEILVNQLHSL RNYYSHYKHKKPDAEKDIFKHLYKAFDASLRMVKEDYKAHFTVNLTR DFAHLNRKGKNKQDNPDFNRYRFEKDGFFTESGLLFFTNLFLDKRD AYWMLKKVSGFKASHKQREKMTTEVFCRSRILLPKLRLESRYDHNQ MLLDMLSELSRCPKLLYEKLSEENKKHFQVEADGFLDEIEEEQNPFK DTLIRHQDRFPYFALRYLDLNEFSKSIRFQVDLGTYHYCIYDKKIGDEQ EKRLTRTLLSFGRLQDFTINRPQEWKALTKDLDYKETSNOQPFISKT

		TPHYHITDNKIGFRLGTSKELYPSEIKDGANRIAKYPYNSGFVAHAFI SVHELLPLMFYQHLLTGKSEDLLKETVRHIQRIYKDFEERINTIEDLEK ANQGRPLPGAFFPKQMLGLLQNKQPDSEKAKIKIEKLAETKLLSHRL NTKLKSSPKLGKRREKLIKTVGLADWLVKDFMRFPVAYDAQNQPI KSSKANSTEFWFIRRALALYGGEKNRLEGYFKQTNLIGNTNPHFLN KFNWKACRNLVDFYQQYLEQREKFLEAIKNQPWEPYQYCLLLKIPKE NRKNLVKGWEQGGISLPRGLFTEAIRETLEDLMLSKPIRKEIKKHGR VGFISRAITLYFKEKYQDKHQSFYNLSYKLEAKAPLLKREEHYEYWQQ NKPQSPTESQRLELHTSDRWKDYLLYKRWQHLEKKLRLYRNQDVM LWLMTELTKNHFELNLYHQLKENLAVNVQEADAKLNPLNQTL PMVLPVKVYPATAFGEVQYHKTPIRTVYIREEHTKALKMGNFKALVK DRRLNGLFSFIKEENDTQKHPISQLRLRRELEIYQSLRVDAFKETLSLE KLLNKHTSLSSLENEFRALLEEWKKEYAASSMVTDEHIAFIASVRNAF CHNQYPFYKEALHAPIPLFTVAQPTTEEKDGLGIAEALLKVLREYCEIV KSQI
260	Cas13	MTNTPKRRTLHRHPSYFGAFLNIARHNAFMIMEHLSTKYDMEDKN TLDEAQLPNAKLFGCLKKRYGKPDVTEGVSRDLRRYPFLNYPFLHL EKQQNAEQAAATYDINPEDIEFTLGKFFRLLNQMRNNYSHYISNTDY GKFDKLPVQDIYEAIFRLLDRGKHTKRFDVFESKHTRHLESNNSEYR PRSLANSPDHENTVAFVTCLFLERKYAFPFLSRLD CFRSTNDAAEGD PLIRKASHECYTMFCCRLPQPKLESSDILLDMVNELGRCPALYNLLS EEDQARFHIKREEITGFEEDPDEELEQEIVLKRHSRDFPYFALRYFDDT EAFQTLRFDVYLGRWRTKPVYKKRIYGQERDRVLTQSIRTFTRLSRL PIYENVKHDVAVRQNEEDGKLVNPDVTSQFHKSUIQIESDDRAFLSD RIEHFSPHYNFGDQVIGLKFINPDYAAIQNVFPKLPGEKKDKDAKL VNETADAIISTHEIRSLFLYHYLSKKPISAGDERRFIQVDTETFIQYIDT IKLFFEDIKSGELQPIADPPNYQKNEPLPYVRGDKEKTQEERAQYRER QKEIKERRKELNTLLQNRYGLSIQYIPSRLEYLLGYKKVPYEKLALQKL RAQRKEVKKRIKDIEKMRTPRVGEQATWLAEDIVFLTPPKMHTPER KTTKHPQKLNNQFRIMQSSLAYFSVNKKAIKKFFQKETGIGLSNRE TSHPFYLRIDVGRGILDFYTGYLKYKMDWLDDAIKKVDNRKHGK KEAKKYEKYLPSIQHKTPLELDYTRLPVYLPRGLFKKAIVKALAAHAD FQVEPEEDNVIFCLDQLLDGDTQDFYNWQRYRSALTEKETDNQLV LAHPYAEQILGTIKTLEGKQKNNKLGNAKQKIKDELIDLKRAKRRL DREQYLRAVQAEDRALWLMIQERQKQKAEHEEIAFDQLDLKNITKI LTSIDARLRIPDTKVDITDKLPLRRYGD LRRVAKDRRLVNLASYHV AGLSEIPYDLVKKELEEDRRRVAFHEHVYQFEKEVYDRYAAELNEN PKGESTYFHWYVAVAVKHSADTHFNELFKEKVMQLRNKFHHNE FPYFDWLLPEVEKASAALYADRVFDVAEGYYQKMRKLMRQ

261	Cas13	MTNTPKRRTLHRHPSYFGAFLNIARHNAFMIMEHLSTKYDMEDKN TLDEAQLPNAKLFGLCKKRYGKPDVTEGVSRDLRRYFPFLNYPLFLHL EKQQNAEQAAATYDINPEDIEFTLKGGFRLLNQMRNNYSHYISNTDY GKFDPKLPVQDIYEAIFRLLDRGKHTKRFDVFESKHTRHLESNNSEYR PRSLANSPDHENTVAFVTCLFLERKYAFPFLSRLDRCFRSTNDAAEGD PLIRKASHECYTMFCCRLPQPKLESSDILLDMVNELGRCPALYNLLS EEDQARFHIKREEITGFEDPDEELEQEIVLKRHSRFPYFALRYFDDT EAFQTLRFDVYLGRWRTKPVYKKRIYGQERDRVLTQSIRTFTRLSRLL PIYENVKHDAVRQNEEDGKLVNPDVTSQFHKSUIQIESDDRAFLSD RIEHFSPHYNFGDQVIGLKFINPDYAAIQNVFPLPGEEKDKDKAKL VNETADAIISTHEIRSLFLYHYLSKKPISAGDERRFIQVDTETFIKQYIDT IKLFFEDIKSGELQPIADPPNYQKNEPLPYVRGDKEKTQEERAQYRER QKEIKERRKELNTLLQNRGLSIQYIPSRRLREYLLGYKVPYEKLALQKL RAQRKEVKKRIKDIEKMRTPRVGEQATWLAEDIVFLTTPPKMHTPER KTTKHPQKLNNDDQFRIMQSSLAYFSVNKKAIAKFFQKETGIGLSNRE TSHPFYLRIDVGRRCRGLDFYTGILYKMDWLDDAIKKVDNRKHGK KEAKKYEKYLPSSIQHKTPLELDYTRLPVYLPRGLFKKAIVKALAAHAD FQVEPEEDNVIFCLDQLDGGDTQDFYNWQRYRSALTEKETDNQLV LAHPYAEQILGTIKTLEGKQKNNKLGNAKQKIKDELIDLKRAKRRLL DREQYLRAVQAEDRALWLMQERQKQKAEHEEIAFDQLDLKNITKI LTESIDARLRIPDTKVDITDKPLRRYGDRLRVAKDRRLVNLASYHV AGLSEIPYDLVKKELEEDRRRVAFHEHVYQFEKEVYDRYAAELRNEN PKGESTYFSHWYVAVAVKHSADTHFNELFKEKVMQLRNKFHHNE FPYFDWLLPEVEKASAALYADRVFDVAEGYQKMRKLMRQ
262	Cas13	MEKPLLPNVYTLKHKFFWGAFLNIARHNAFITICHINEQLGLKTPSN DDKIVDVVCETWNNILNNDHDLKKSQLTELILKHFPFLTAMCYHPP KKEGKKKGHQKEQKEKESEAQSQAELNPSKLEALEILVNQLHSL RNYYSHYKHKKPDAEKDIFKHLYKAFDASLRMVKEDYKAHFTVNLTR DFAHLNRKGKKNQDNPDFNRYRFEKDGFFTESGLLFFTNFLDKRD AYWMLKKVSGFKASHKQREKMTTEVFCSRILLPKLRLESRYDHNQ MLLDMLSELSRCPKLLYEKLSEENKKHFQVEADGFLDEIEEEQNPFK DTLIRHQDRFPYFALRYLDLNEFSKIRFQVDLGTYHYCIYDKKIGDEQ EKRHLTRTLLSFGRLQDFTEINRPQEWKALTKDLDYKETSQNPFIKT TPHYHITDNKIGFRLGTSKELYSLEIKDGANRIAKYPYNSGFVAHAFI SVHELLPLMFYQHLTGKSEDLLKETVRHIQRIYKDFEEERINTIEDLEK ANQGRLPLGAFPKQMLGLLQNKQPDLEKAKIKIEKIAETKLLSHRL NTKLKSSPKLGKRREKLIKTVGLADWLKDFMRFPQVAYDAQNQPI KSSKANSTEFWFIRRALALYGGEKNRLEGYFKQTNLIGNTNPHPFLN

		KFNWKACRNLVDFYQQYLEQREKFLEAIKNQPWEPYQYCLLLKIPKE NRKNLVKGWEQGGISLPRGLFTEAIRETSEDMLMSKPIRKEIKKHGR VGFISRAITLYFKEKYQDKHQSFYNLSYKLEAKAPLLKREEHYEYWQQ NKPQSPTESQRLELHTSDRWKDYLLYKRWQHLEKKLRLYRNQDVM LWLMTLELTKNHFKELNLNYHQLKENLAVNVQEADAKLNPLNQT PMVLPVKVYPATAFGEVQYHKTPIRTVYIREEHTKALKMGNFKALVK DRRLNGLFSFIKEENDTQKHPISQLRLRRELEIYQSLRVD AFKETLSLEE KLLNKHTSLSSLENEFRALLEEWKKEYAASSMVTDEHIAFIASVRNAF CHNQYPFYKEALHAPIPLFTVAQPTTEEKDGLGIAEALLKVLREYCEIV KSQI
263	Cas13	MEKPLLPNVYTLKHKFFWGAFLNIARHNAFITICHINEQLGLKTPSN DDKIVDVVCETWNNILNNDHDLKKSQLTELILKHPFLTAMCYHPP KKEGKKKGHQKEQQKEKESEAQSQAELNPSKLEALEILVNQLHSL RNYYSHYKHKPD AEKDIFKHLYKAFDASLRMVKEDYKAHFTVNLTR DFAHLNRKGKNQDNPDFNRYRFEKDGFFTESGLLFTNLFLDKRD AYWMLKKVSGFKASHKQREKMTTEVFCSRILLPKLRLESRYDHNQ MLDMLSELRCPKLLYEKLSEENKKHFQVEADGFLDEIEEEQNPFK DTLIRHQDRFPYFALRYLDLNEFSKIRFQVDLGTYHYCIYDKKIGDEQ EKRLHTRTLLSFGRLQDFTEINRPQEWKALTKDL DYKETSNPFSKT TPHYHITDNKIGFRLGTSKELYPSEIKDGANRIAKYPYNSGFVAHAFI SVHELLPLMFYQHLTGKSEDLLKETVRHIQRIYKDFEEERINTIEDLEK ANQGRPLPGAFPKQMLGLLQNKQPD LSEKAKIKIEKLAETKLLSHRL NTKLKSSPKLGKRREKLIKTVGLADWL VKDFMRFPQPVAYDAQNQPI KSSKANSTEFWFIRRALALYGGEKNRLEGYFKQTNLIGNTNPHFPLN KFNWKACRNLVDFYQQYLEQREKFLEAIKNQPWEPYQYCLLLKIPKE NRKNLVKGWEQGGISLPRGLFTEAIRETSEDMLMSKPIRKEIKKHGR VGFISRAITLYFKEKYQDKHQSFYNLSYKLEAKAPLLKREEHYEYWQQ NKPQSPTESQRLELHTSDRWKDYLLYKRWQHLEKKLRLYRNQDVM LWLMTLELTKNHFKELNLNYHQLKENLAVNVQEADAKLNPLNQT PMVLPVKVYPATAFGEVQYHKTPIRTVYIREEHTKALKMGNFKALVK DRRLNGLFSFIKEENDTQKHPISQLRLRRELEIYQSLRVD AFKETLSLEE KLLNKHTSLSSLENEFRALLEEWKKEYAASSMVTDEHIAFIASVRNAF CHNQYPFYKEALHAPIPLFTVAQPTTEEKDGLGIAEALLKVLREYCEIV KSQI
264	Cas13	MEKPLLPNVYTLKHKFFWGAFLNIARHNAFITICHINEQLGLKTPSN DDKIVDVVCETWNNILNNDHDLKKSQLTELILKHPFLTAMCYHPP KKEGKKKGHQKEQQKEKESEAQSQAELNPSKLEALEILVNQLHSL

		RNYYSHYKHKKPDAEKDIFKHLYKAFDASLRMVKEDYKAHFTVNLTR DFAHLNRKGKKNQDNPDFNRYRFEKDGFFTESGLLFFTNLFLDKRD AYWMLKKVSGFKASHKQREKMTTEVFCSRILLPKLRLESRYDHNQ MLLDMLSELSRCPKLLYEKLSEENKKHFQVEADGFLDEIEEEQNPFK DTLIRHQDRFPYFALRYLDLNEFSKSIRFQVDLGTYHYCIYDKKIGDEQ EKRLHTRTLLSFGRLQDFTEINRPQEWKALTKDLDYKETSNOQPFISK TPHYHITDNKIGFRLGTSKELYPSEIKDGANRIAKYPYNSGFVAHAFI SVHELLPLMFYQHLLTGKSEDLLKETVRHIQRIYKDFEEERINTIEDLEK ANQGRPLPGAFPKQMLGLLQNKQPDSEKAKIKIEKLAETKLLSHRL NTKLKSSPKLGKRREKLIKTVGLADWLKDFMRFPQVAYDAQNQPI KSSKANSTEFWFIRRALALYGGEKNRLEGYFKQTNLIGNTNPHFPLN KFNWKACRNLVDFYQQYLEQREKFLEAIKNQPWEQYQYCLLLKIPKE NRKNLVKGWEQGGISLPRGLFTEAIRETSEDLMLSKPIRKEIKKHGR VGFISRAITLYFKEKYQDKHQSFYNLSYKLEAKAPLLKREEHYEYQQ NKPQSPTESQRLEHTSDRWKDYLLYKRWQHLEKKLRLRYNQDVM LWLMTELTKNHFKELNLYHQLKENLAVNVQEADAKLNPLNQTL PMVLPVKVYPATAFGEVQYHKTPIRTVYIREEHTKALKMGNFKALVK DRRLNGLFSFIKEENDTQKHPISQLRLRRELEIYQSLRVDAFKETLSLE KLLNKHTSLSSLENEFRALLEEWKKEYAASSMVTDEHIAFIASVRNAF CHNQYPFYKEALHAPIPLFTVAQPTTEEKDGLGIAEALLKVLREYCEIV KSQI
265	Cas13	MESIKNSQKSTGKTLQKDPYPFGLYLNMALLNVRKVENHIRKWLG VALLPEKSGFHSLLTTDNLSSAKWTRFYKSRKFLPFLEMFDSKKS ENRRETTECLDTIDRQKISSLLKEVYQGLQDIRNAFSHYHIDDQSVKH TALISSEMHRFIENAYSFALQKTRARFTGVFVETDFLQAEKGDNKK FFAIGGNEGIKLDNALIFLCLFLDREEAFKFLSRATGFKSTKEKGFLA VRETFCALCCRQPHERLLSVNPREALLMDMLNELNRCPDILFEMLD EKDQKSFLPLLGEQEAHILENSLNDELCEAIDDPFEMIASLSKRVRYK NRFPYLMLRYIEEKNLLPFIRFRIDLGCLELASYPKKMGEEENYERSVT DHAMAFGRITDFHNEAVLQQITKGITDEVRFSLYAPRYAIYNNKIG FVRTGGSDKISFPTLKKKGGEHCVAYTLQNTKSGFISYDLRKILL FLDKDAKNIVSGLLEQCEKHWKDLSENLFDAIRTELQKEFPVPLIRY TLPRSKGGKLVSSKLADKQEKYESEFERRKEKLEILSEKDFDLSQIPRR MIDEWLNVLPTSREKKLKGYYETLKLDCRERLRVFEKREKGEHPVPP RIGEMATDLAKDIIRMVIDQGVKQRITSAYYSEIQRCLAQYAGDDNR RHLDISIIRLRLKDTKNHGFPLGKVLRLPGLGHTKLYQRYFEEKKEWL EATFYPAASPKRVPRFVNPPTGKQKELPLIIRNLMKERPEWRDQKQ RKNSHPIDLPSQLFENEICRLLKDKIGKEPSGKWKWNEMFKLYWDKE FPNGMQRFYRCKRRVEVFDKVVVEYSEEGGNYKKYALIDEVVR QKISSSKEKSLQVEDLTLVRRVFKRAINEKEYQLRLLCEDDRLLFMA

		VRDLYDWKEAQLDLKDIDNMLGEPVSVSQVIQLEGGQPD AVIKAE CKLKDVSKLMRYCYDGRVKGLMPYFANHEATQEQVEMELRHYED HRRRVFNWVFALEKSVLKNEKLRRFYEESSQGGCEHRRCIDALRKASL VSEEEYFLVHIRNKS AHNQFPDLEIGKLPPNVTSGFCECIWSKYKAI CRIIPFIDPERRFFGKLEQK
266	Cas13	MEKPLPPNVYTLKHKFFWGAF LN IARHNAFITICHINEQLGLTTPPN DDKIADVCGTWNINLNDHDLKKSQ LTELILKHFPFLAAMCYHP PKKEGKKKGSQKEQKEKEKEKENEASQAEALNPSELIKVLKTIVK QLRTL RNYSSHSHKKPDTEKDIFKHLYKAFDASLRMVKEDYKAHFT VNLTRDFAHLNRKGKNKQDNPDFNRYRFEKDGFFTESGLLFFTNLFL DKRDAYWMLKKVSGFKASHKQREKMTTEVFCSRSHILLPKLRLESRY DHNQM LLDMLSELSRCPKLLYEKLSEENKKHFQVEADGFLDEIEEEQ NPFKDTLIRHQDRFPYFALRYDLNESFKSIRFQVDLGTYHYCIYDKKI GDEQEKRLHTRTLLSFGRLQDFTEINRPQEWKALTKDL DYKETS NQP FISKTTPHYHITDNKIGFRLGTSKELYSLEIKDGANRIAKYPYNSGFVA HAFISVHELLPLMFYQHLTGKSEDLLKETVRHIQRIYKDFEERINTIE DLEKANQGRPLGAFPKQMLG LLQNKQPD LSEKAKIKIEKLIAETKLL SHRLNTKLKSSPKLGKRREKLIKTGV LADWLKDFMRFPVAYDAQ NQPIKSSKANSTEFWFIRRALALYGG EKNRLEGYFKQTNLIGNTNPH PFLNKFNWKACRNLVDFYQQYLEQREKFLEAIKNQPWEPYQYCLLL KIPKENRKNLVKGWEQGGISLPRGLFTEAIRET LSEDMLSKPIRKEIK KHGRVGFISRAITLYFKEKYQDKHQSFYNLSYKLEAKAPLLKREEHYEY WQQNKQPSPTESQRLELHTSDRWKDYLLYKRWQHLEKLR LRYRNQ DIMLWLMTELTKNHFKELNLNYHQLKENLAVNVQEADAKLNPL NQTLPMVLPVKVYPATAFGEVQYQETPIRTVYIREETHKALKMGNF KALVKDRRLNGLFSFIKEENDTQKHPISQLRLRRELEIYQSLRVD AFKE TLDLEEKLLKKHTSLSSLENKFRILLEEWKKEYAASSMVTDEHIAFIAS VRNAFCHNQYPFYEALHAPIPLFTVAQQTTEEK DGLGIAEALLRVL REYCEIVKSQI
267	Cas13	MFFSFHNAQRVIFKHLYKAFDASLRMVKEDYKAHFTVNLTRDFAHL NRKGKNKQDNPDFNRYRFEKDGFFTESGLLFFTNLFLDKRDAYWM LKKVSGFKASHKQREKMTTEVFCSRILLPKLRLESRYDHNQM LLD MLSELSRCPKLLYEKLSEENKKHFQVEADGFLDEIEEEQNPFKDTLIR HQDRFPYFALRYDLNESFKSIRFQVDLGTYHYCIYDKKIGDEQEKRH LTRTLLSFGRLQDFTEINRPQEWKALTKDL DYKETS NQPFISKTTPHY HITDNKIGFRLGTSKELYSLEIKDGANRIAKYPYNSGFVAHAFISVHE LLPLMFYQHLTGKSEDLLKETVRHIQRIYKDFEERINTIEDLEKANQG

		RLPLGAFPKQMLGLLQNKQPDLSEKAKIKIEKLAETKLLSHRLNTKLK SSPKLGKRREKLIKTVGLADWLKDFMRFPVAYDAQNQPIKSSKA NSTEFWFIRRALALYGGEKNRLEGYFKQTNLIGNTNPHFPLNKFNW KACRNLDVDFYQQYLEQREKFLEAIKNQPWEPYQYCLLLKIPKENRKN LVKGWEQGGISLPRGLFTEAIRETSEDMLMSKPIRKEIKKHGRVGFIS RAITLYFKEKYQDKHQSFYNLSYKLEAKAPLLKREEHYEYWQQNKPQ SPTEQRLELHTSDRWKDYLLYKRWQHLEKKLRLYRNQDVMLWLM TLELTKNHFKELNLNYHQLKLENLAVNVQEADAKLNPLNQTLPMLV PVKVYPATAFGEVQYHKTPIRTVYIREEHTKALKMGNFKALVKDRRL NGLFSFIKEENDTQKHPISQLRLRRELEIYQSLRVDAFKETLSLEEKLLN KHTSLSSLENEFRALLEEWKKEYAASSMVTDEHIAFIASVRNAFCHN QYPFYKEALHAPIPLFTVAQPTTEEKDGLGIAEALLKVLREYCEIVKSQI
268	Cas13	MEKPLPPNVYTLKHKFFWGAFLNIARHNAFITICHINEQLGLTTPPN DDKIADVCGTWNINLNDHDLKKSQLTEILKHFPLAAMCYHP PKKEGKKKGSQKEQKEKEKEKENEASQSAEALNPSELIVLKTIVK QLRTLNRNYYSHSHKKPDTEKDIFKHLYKAFDASLRMVKEDYKAHFT VNLTRDFAHLNRKGKNQDNPDFNRYRFEKDGFFTESGLLFFTNLFL DKRDAYWMLKKVSGFKASHKQREKMTTEVFCSRSHILLPKLRLESRY DHNQMLLDMLSELSRCPKLLYEKLSEENKKHFQVEADGFLDEIEEQ NPFKDTLIRHQDRFPYFALRYLDLNEFSKIRFQVDLGYHYCIYDKKI GDEQEKRLHTRTLLSFGRLQDFTEINRPQEWKALTKDLDYKETSQNP FISKTTPHYHITDNKIGFRLGTSKELYPSLEIKDGANRIAKYPYNSGFVA HAFISVHELLPLMFYQHLTGSSEDLKETVRHIQRIYKDFEERINTIE DLEKANQGRPLGAFPKQMLGLLQNKQPDLSEKAKIKIEKLAETKLL SHRLNTKLKSSPKLGKRREKLIKTVGLADWLKDFMRFPVAYDAQ NQPIKSSKANSTEFWFIRRALALYGGEKNRLEGYFKQTNLIGNTNPH PFLNKFNWKACRNLDVDFYQQYLEQREKFLEAIKNQPWEPYQYCLLL KIPKENRKNLVKGWEQGGISLPRGLFTEAIRETSEDMLMSKPIRKEIK KHGRVGFISRAITLYFKEKYQDKHQSFYNLSYKLEAKAPLLKREEHYEY WQQNKPQSPTEQRLELHTSDRWKDYLLYKRWQHLEKKLRLYRNQ DIMLWMLTLELTKNHFKELNLNYHQLKLENLAVNVQEADAKLNPL NQTLPMLVPVKVYPATAFGEVQYQETPIRTVYIREEHTKALKMGNF KALVKDRRLNGLFSFIKEENDTQKHPISQLRLRRELEIYQSLRVDAFKE TLDLEEKLLKHTSLSSLENKFRILLEEWKKEYAASSMVTDEHIAFIAS VRNAFCHNQYPFYEALHAPIPLFTVAQQTTEEKDGLGIAEALLRVL REYCEIVKSQI

269	Cas13	MGAIENKHIFAAYANLAIDGLIKTLNFI AKKLD TQKQLSSWDIKHVITL IDSIFDQNPQNNLEQVVEGYLPWIKPIEMKTPKKGERQSDKLCIEYK TIITAFASLLNDVRNYYTHYYHDPICIYPGGYDIPSSLNCIYDSAINIIE RFQAEKEIEHLRRYTRKKGRVVLKTEDDHFYTLVNNNDLSEKGYA FFISMFLERKYSYFLKKLSGFKRGDSLQYRLTLEVFTALSTKPPVERLR TTKDTKQDRALDILNELSRIPIELYQTLEPKYREMYNETLQPTDAEDP YGLPDRSRIRFRSRFEAFALHFLDKQADFKEIGFYTYLGNFYHNGYQK TRVDRET KDRYINFQLAGFCKNIQDISAKKLSEALNVKSIDISTDSIPDI NSFEPYLVQSTPHYIVNGNNGIKVLPEGKDTYPTIDEKGAKMPIADF WLSKYELPAMLFYTYLRNNNIHKSHCPLSVKDIIERSIHKSTKQKHPE ERSELMMLRRVMKAIFWTD SKLNEVERIKSQKSAFGKRQHEILKAGRI AETLVRDMLWLQPSKNNGRDKVTEPNFQAIQVSLAYFGIRRNDLTE IFTRAGLINSSNPHFPLAQIGTNYTSLIEFYIAYLKERKVYFSRIQKKILQ GKLNIQCHPLRDLQREPKNPQDKEEAIFLPRGLFNEAIINCLKSKLK QLIESPTREKSPALNVSYLIQNYFRTYFEDQSQEFYAPRNYRLFDKL SPNKGKSKSYLSLEQRIKKMEELRPSKIPVAEANKLEKEDRLYRKNY NEICDNESIIRLYQIQDILLFMMTKEYLPSDLYNRINKYKLENVKGILN ERVSYLIDLNLPLKIQGEDIKIDYGKLFYIHHDRISLNVLSKVKRNN SISSSVKIOPYENYKRECLDFEEAQIIPIIHSFEIAMVSMFPDLKAT PGNYYDFNELITEYEKRTKQKIDSSFLIKTRNMFLHDKYEAECIKEISD DFVYAKKIIAEFKMKIENIKLEDLSNDSSA
270	Cas13	MEKPLLPNVYTLKHKFFWGAFLNIARHNAFITCHINEQLGLKTPSN DDKIVDVVCETWNNILNNDHDLKKSQLTELILKHPFLTAMCYHPP KKEGKKKGHQQEQKEKESEAQSQAELNPSKLEALEILVNQLHSL RNYSSHYYKHKKPDAEKDIFKHLYKAFDASLRMVKEDYKAHFTVNLTR DFAHLNRKGKNKQDNPDFNRYRFEKDGFFTESGLLFFTNLFLDKRD AYWMLKKVSGFKASHKQREKMTTEVFCSRILLPKLRLESRYDHNQ MLLDMLSEL SRCPKLLYEKLSEENKKHFQVEADGFLDEIEEEQNPFK DTLIRHQDRFPYFALRYLDLNE SFKSIRFQVDLGTYHYCIYDKKIGDEQ EKRHLTRTLLSFGRLQDFTEINRPQEWKALTKDLDYKETS NQPFISK TPHYHITDNKIGFRLGTSKELYSLEIKDGANRIAKYPYNSGFVAHAFI SVHELLPLMFYQH LTGKSEDLLKETVRHIQRIYKDFEEERINTIEDLEK ANQGRLPLGAFPKQMLGLLQNKQPD LSEKAKIKIEKLI AETKLLSHRL NTKLKSSPKLGKRREKLIK TGVLADWL VKDFMRFPVAYDAQNQPI KSSKANSTEFWFIRRALALYGGEKNRLEGYFKQTNLIGNTNPHFLN KFNWKACRNLVDFYQQYLEQREKFLEAIKNQPWEPYQYCLLLKIPKE NRKNLVKDWEQGGISLPRGLFTEAIRETLSEDMLSKPIRKEIKKHGR VGFISRAITLYFKEKYQDKHQSFYNLSYKLEAKAPLLKREEHYEYWQQ NKPQSPTESQRLELHTSDRWKDYLLYKRWQHLEKKLRLYRNQDVM LWLMTELTKNHFKELNLNYHQLKENLAVNVQEADAKLNPLNQTL

		PMVLPVKVYPATAFGEVQYHKTPIRTVYIREEHTKALKMGNFKALVK DRRLNGLFSFIKEENDTQKHPISQLRLRRELEIYQSLRVDAFKETLSLEE KLLNKHTSLSSLENEFRALLEEWKKEYAASSMVTDEHIAFIASVRNAF CHNQYPFYKEALHAPIPLFTVAQPTTEEKDGLGIAEALLKVLREYCEIV KSQI
271	Cas13	MEKPLPPNVYTLKHKFFWGAFLNIARHNAFITICHINEQLGLTTPPN DDKIADVCGTWNINLNDHDLKKSQTEILKHFPLAAMCYHP PKKEGKKKGSQKEQKEKENEASQAELNPSELIKALKTIVKQLRT LRNYYSHYKHKKPDAEKDIFKHLYKAFDASLRMVKEDYKAHFTVNLT QDFAHLNRKGKKNQDNPKFDYRFEKDGFFTESGLLFTNLFLDKR DAYWMLKKVSGFKASHKQSEKMTTEVFCSRILLPKLRLESRYDHN QMLLDMLSELSRCPKLLYEKLSEKDKKHQVEADGFLDEIEEQNPF KDALIRHQDRFPYFALRYDLNESFKSIRFQVDLGTYHYCIYDKKIGDE QEKRLHTRTLLSFGRQLQDFTEINRPQEWKALTKDLDYKETSQKPFISK TTPHYHITDNKIGFRLGTSKELYPSEVKDGANRIAKYPYNSDFVAHA FISVHELLPLMFYQHLTGSSEDLKETVRHIQRIYKDFEEERINTIEDLE KANQGRLPLGAFPKQMLGLLQNKQPDSEKAKIKIEKLIETKLSHR LNTKLKSSPKLGRREKLIKTVGLADWLKDFMRFQPVAYDVQNQP IESSKANSTEFQLIQRALALYGGEKNRLEGYFKQTNLIGNTNPHPLN KFNWKACRNLVDFYQQYLEQREKFLEAIKNQPWEPYQYCLLLKIPKE NRKNLVKGWEQGGISLPRGLFTEAIRETSEDLTLSKPIRKEIKKHGRV GFISRAITLYFRERYQDDHQSFYNLPELEAKASTPKPPLPKKREYVLR AEHYEYWQKNKQSPTELRLELHTSDRWKDYLLYKRWQHLEKKL RLYRNQDVMLWMLTLELTKNHFKELKLNHYQLKLENLAVNVQEAD AKLNPLNQTLPMVLPVKVYPATAFGEVQYQETPIRTVYIREEQTKAL KMGNFKALVKDRRLNGLFSFIKEENDTQKHPISQLRLRRELEIYQSLR VDAFKETLSLEEKLLNKHASLSSLENEFRLLLEEWKKKYAASSMVTDE HIAFIASVRNAFCHNQYPFYKETLHAPILLFTVAQPTTEEKDGLGIAEA LLRVLREYCEIVKSQI
272	Cas13	MEKPLPNVYTLKHKFFWGAFLNIARHNAFITICHINEQLGLKTPSN DDKIVDVVCEWNNINLNDHDLKKSQTEILKHFPLTAMCYHPP KKEGKKKGHQKEQKEKESEAQSQAELNPSEKLEALEILVNQLHSL RNYYSHYKHKKPDAEKDIFKHLYKAFDASLRMVKEDYKAHFTVNLT DFAHLNRKGKKNQDNPDFNRYRFEKDGFFTESGLLFTNLFLDKRD AYWMLKKVSGFKASHKQREKMTTEVFCSRILLPKLRLESRYDHNQ MLLDMLSELSRCPKLLYEKLSEENKKHFQVEADGFLDEIEEQNPFK DTLIRHQDRFPYFALRYDLNESFKSIRFQVDLGTYHYCIYDKKIGDEQ

		EKRHLTRTLLSFGRLQDFTEINRPQEWKALTKDLDYKETS NQPFISK T TPHYHITDNKIGFRLGTSKELYPSEIKDGANRIAKYPYNSGFVAHAFI SVHELLPLMFYQHLTGKSEDLLKETVRHIQRIYKDFEERINTIEDLEK ANQGRPLGAFPKQMLGLLQNKQPDSEKAKIKIEKLI AETKLLSHRL NTKLKSSPKLGKRREKLIK TGVLADWL VKDFMRFQPVAYDAQNQPI KSSKANSTEFWFIRRALALYGGEKNRLEGYFKQTNLIGNTNPHPFLN KFNWKACRNLVDFYQQYLEQREKFLEAIKNQPWEPYQYCLLLKIPKE NRKNLVKGWEQGGISLPRGLFTEAIRET LSEDMLSKPIRKEIKKHGR VGFISRAITLYFKEKYQDKHQSFYNLSYKLEAKAPLLKREEHYEYWQQ NKPQSPTESQRLELHTSDRWKDYLLYKRWQHLEKKLRLYRNQDVM LWLMTLELTKNHFKELN LNYHQLKENLAVNVQEADAKLNPLNQT L PMVLPVKVYPATAFGEVQYHKTPIRT VYIREEHTKALKMGNFKALVK DRRLNGLFSFIKEENDTQKHPISQLRLRRELEIYQSLRVD AFKETLSLEE KLLNKHTSLSSLENEFRALLEEWKKEYAASSMVTDEHIAFIASVRNAF CHNQYPFYKEALHAPIPLFTVAQPTTEEKDGLGIAEALLKVLREYCEIV KSQI
273	Cas13	MEKPLLPNVYTLKHKFFWGAFLNIARHNAFITICHINEQLGLKTPSN DDKIVDVVCETWNNILNNDHDLKKSQLTELILKHFPFLTAMCYHPP KKEGKKKGHQKEQQKEKESEAQSQA EALNPSKLI EAILELVNQLHSL RNYYSHYKHKKPDAEKDIFKHLYKA FDASLRMVKEDYKAHFTVNLTR DFAHLNRKGKNKQDNPDFNRYRFEKDGFFTESGLLFFTNLFLDKRD AYWMLKKVSGFKASHKQREKMTTEVFCSRILLPKLRLESRYDHNQ MLLDMLSEL SRCPKLLYEKLSEENKKHFQVEADGFLDEIEEEQNPFK DTLIRHQDRFPYFALRYDLNESFKSIRFQVDLGTYHYCIYDKKIGDEQ EKRHLTRTLLSFGRLQDFTEINRPQEWKALTKDLDYKETS NQPFISK T TPHYHITDNKIGFRLGTSKELYPSEIKDGANRIAKYPYNSGFVAHAFI SVHELLPLMFYQHLTGKSEDLLKETVRHIQRIYKDFEERINTIEDLEK ANQGRPLGAFPKQMLGLLQNKQPDSEKAKIKIEKLI AETKLLSHRL NTKLKSSPKLGKRREKLIK TGVLADWL VKDFMRFQPVAYDAQNQPI KSSKANSTEFWFIRRALALYGGEKNRLEGYFKQTNLIGNTNPHPFLN KFNWKACRNLVDFYQQYLEQREKFLEAIKNQPWEPYQYCLLLKIPKE NRKNLVKGWEQGGISLPRGLFTEAIRET LSEDMLSKPIRKEIKKHGR VGFISRAITLYFKEKYQDKHQSFYNLSYKLEAKAPLLKREEHYEYWQQ NKPQSPTESQRLELHTSDRWKDYLLYKRWQHLEKKLRLYRNQDVM LWLMTLELTKNHFKELN LNYHQLKENLAVNVQEADAKLNPLNQT L PMVLPVKVYPATAFGEVQYHKTPIRT VYIREEHTKALKMGNFKALVK DRRLNGLFSFIKEENDTQKHPISQLRLRRELEIYQSLRVD AFKETLSLEE KLLNKHTSLSSLENEFRALLEEWKKEYAASSMVTDEHIAFIASVRNAF

		CHNQYPFYKEALHAPIPLFTVAQPTTEEKDGLGIAEALLKVLREYCEIV KSQI
274	Cas12a	MKSLAQFQNLALQKTLRFELKPEGHTRETENRWLEEIEKEQASENE NIVYQDLLRAKKYEKIKIILDEYHKDFIEQALAYANLLEKYEELYRKS NRTSEEEEFENTKESLRKQIANIFIKNPNTVQERWKFLFSKKLIQNE LIVWVKGNLYELLSEKLKNEFPDESSIISTIEDFKYFTTYFRNYHENRKNL YSNEDKFSTIAHRLIHENLPKFIDNIAIYQKAKAVLNINEVEKELGLPED TLDKIFSLDFFSKALTQKQIDQYNYFLGGKTENEVKKIKGLNEFINLYN QQQQDKNQRLPFLKVLYKLPLFERTSTSRFEPIENDRDIERIGKFYY NDLKQYRDDSDQDITDILSGINTLLRHVHDYRDGLYVNGGITLTQIS QKIFGSWSYINNALAYFYDTYIDASGVDHQGERKPKKQKQIQEKT WLKQKQFPVILVEKALSEYKSIETNEDLKTRISDTTLCDDFFKRCGND NGQDLFDRIEARLREKNEEGYSLEDLLKKEFTTERKLMQDKTKTLIK NFLDVIQGDKDDITAGLLHFVKCLIPRTEISEKNELFYSGMEKYLNILS EVTPLYNKARNYLTKQPSYIEKVKNFENSTLLDGDWDENEESDNCV LLRKRGYLGLIMNKKHNMIFDRKIYPKATEGEAYYEKMIYKLLPGAY KMLPKVFFSEKNIDYFKPSEEILRIRNTASYSKNGQPQEGYQKASFSIE DCRKYIDFFKKCIANHWWDWQKFNFNFSPTYYQSIDEFYREIERQGY KIDFVKIPESYINQLIKENKLYLFKIYNKDFSEKKKSKGKDNLHTLYWK MLFDEKNLKDVLKLNGEAEVFRQKSILYNEEIWNKGHHYSELKDR FSYPIISNKRYAEDKFFLHVPITLNFKADGINNVNMMVNEFIKDNNDI HIIGIDRGERHLLYVSVINQKGDIVEQCSLNEIVTEYNGKIFKKNYHEE LDNLEKERDRARKDWQTIANIKELKEGYLSHVIHKISKILKYNIVV MEDLNSGFKRGRQKVEKQVYQNFQKQIEKLNLYLVKESNVDEPGG VLAYQLANKFETFKKLQKSGIIFYVPAAYTSAIDPVTGYIYQYPLK QADSVEKARKFYSQFKRISYNPHKQWFEFSFDYNDFNIIYHGKSSWT ICTTNTERYMWNRLNNGHGGEEVYVTNELELLFGEYNIYGDGKD IKQQITDVQDIDVDRTAKQFYKRINELLNLTLKLRHNGKKGADDEED YILSPVEPYFDSRFESRKPSMQQTLPINADANGAFNIARKGLLLERL NQLGVVEFEKTKKSNNKKTQWLPHELWVEYAQNHTRK
275	Cas12a	MQDKTGWSSFTNKYSLSKTLRFELKPVGNTQKMLEDDGVFQKDRE RQENYKKVKPFMDKLHREFIKEALNNLKLEGLTEYFEIFKKFRKDKN KELKNAEKKLRQIIGRCYTETAQIWWVEKYKEFGFKKNIGFLFEEGVFE LMKLKYGNDEASQIEKNGEVLISFDGWKGFLGYFKKFFETRNNFYKD DGTSTAVSTRIINENLKIYLDNLIKYNKIKDKVDFKEADILQENKLNLS DFFNVESYAKYSLQKIDYNEILGGKTLKNGTKLKLGLNEVINEYKQK NKSGELSKFKMLKKQJLGEGERDRLFEEIENEDELKDVLDKDFYNADP

		KITLFKTLLEDDFFSNTEKYKDELDKIYFNTVAINGILHRWVDDSGVFQ KYLFEVLKSNKLVKSNHYDKKEDSYKFPDFISFEHIKVALENCERDGLK DKFWKEKYTTKECLTENGLANLWQEFLEIYKCEFKKLYDYKTDDNDC YLQYRDNYKKYILDANFNPKESAKDIIKDYLDSVLSIYQLAKYFALEK KKVWTTDYETGDFYIEYIKFYEDTYEQIIPYNLVRNYLTRKPINTAKK WKLNFDNAYLASGWWDKDEVSNTLVILRRDEQYYLAIMKKGKNKIF EKKFSCGEFEKMEYKQIAEASSDIHNLVLMNDGSCRRCIKMHDKRK YWPLDISIIEKKSYAKENFVRRDFERFVNYMKKCSLLYWKEYDLKFS DTSTYKNINDFTNEIASQGYKLSFSAIPESYINEKNNNGELYLFQIYNK DFGIKTEGNKNLHTMYWESIFSEENRFRNFIVKLNKGAEIFYRPKSEQ VEKEQRNFTREIKNRRYTENKIYFHCPIITLNRISRENVKKFNNGINNY IATNPINILGVDRGEKHLVYYAIVDQDGKLIDAEDATGSFNTIGSTD YHRLLEEKAKDREKERKDWDLIRGIKDLKKGYISLVVRKIADLAIKYNA IIIFEDLNTRFKQIRGGMEKSVYQQLEKALINKLSFLVNKGEKDPEQA GHLLKAYQLAAPFQTFDKMGRQTGIIFYTQASYTSKIDPITGWRPNL YLKYNIDDSKESIKKFKSILFNKEKNRFEFTYDLKDFVDFEEDKIPEKT EWTLCSSVERHKWNRHMNNKGGYEVYKDLTENFYKLFDENNIS MNKDIVDQVESISNGNFFRQFIYLFNLVCQIRNTDEKAEDVDKRDFI LSPVEPFFDSRRAKDFKAYGDNLPKNGDENGAYNIARKGVLIKKIKE YYNQNGSCDKLWGDLSISHKEWDDFATNN
276	Cas12a	MDSYEQFTKLYPIQKTIRFELKPQGRTKEHFDNSNFLEKDRERDDNY KILKEVIDDYHREFIDECLSNIQNLNWDDLKKFSEYRRSKEKNNRDS ESEQKRMSTTSETRAINKNLEAEQKRMARGEIVSAFKDDRFKHLFS EKLFSILLKNQIYEKGTLEEIAFDCFNKFSGYFKSFHENRKNMYSDED KETAISYRIINENFPKLLDNFEKYQYVCREYPEQIREAESTLAEAGCYIK MDEIFSIDNFNNVMMQGGKESGISRYNLAIGGIVQGTGEKPKGLNE FLNLAYQNEPNRGRKKIRMEPLYKQILSKEESFSYRLEAFTDDSQLLSAI RSFFDIVEKDKNGNIFDRAVNLMSFSNYDTSKIYIRKAYLNQVSKEIF GYRGKSDSKPAKTADESLNKS GGWEKLGQMLRDYKADSIGDRNLE KTCKKVQDKWLDSEFTLSDILGAISLAGSNETFEAYVSEICVARRNIDK EKEKEKNINVEKISGDTESIQIICALLDVQEFFHLLSPFQLHPNTPHD WTFYAEFNIDYDKLSAITPLYNQARNHLTKKNLDTSKIKLNFNNPTLA NGWDVNKEYENTAVILIRDGKYLLGIMNPKNKRKIKFDEGSGAGPF YQKMVYKLLPGPYRMLPKVFFAKKNIDYYNPSQEIREGYKAGKHKK GKEFDKGFCHKLIDFFKESIQKNENWKVDFKFSPTESYDDISEFYQE VEKQGYRMYFVNIPSDTIDRYVEGGDMFLFQIYNKDFAKGAKGNK DMHTLYWNAVSEENLQKGVMLKSGEAEIFYRKKS DIKDPHREG EILVNRTYIDRTHVSGVMGEQNTVKESRIPVPDEIHKNLFDYYNHGR ELTKEEKEYCDKVGSKAYYGIVKDRRYLENKMYFHVPLTLNFKAIGE KRINKMAIEKFLTDENACIIGIDRGERNLLYYSIIDRNGKIIDQKSLNVI

		DGFDYHEKLSQRQTEREVARQSWNSIGKIKDLKEGYLAKAVHEISK MAIKYNAIVVLEDLHFGFKKGRKVEKQIYQKFEEMLINKLNYLVFKD VSDSSDAGGVNLAYQLTAPLESFSKLGKQSGILFYVPAFTSVIDPTT GFVDLFNSSSITSTQKKKEFLQRFESIVYSARDGGIFAFTFYRNFASKIA TDHRNMWTVYTHGERIRYVRDEKCYKTTDPTKRIKEALSGIEYDDGS DIRDKITQSGDNNLINTVYHSFMDTIKMRNKDGRIDYIISPVKNRNG EFFRSDYKHRDFPVDADANGAYHIALKGELLMRMIGKTYDSNSDK MPKLEHKDWFEFMQTRGDQ
277	Cas12b	MCVSRLPWFNITLTGKLNRLNQM CVSRLPWFCTPKGQLAATPK TVVAQQENAMLAIRDVHEAAPADLKTVAQRLEPGYFVTQFPKQQ MTGDEARAEAEERLFAACQKKFKELAEYEDGYRQCLDALGPNLSLPR LGRKPKGAYPYAVVFKLMPTNATWECFKRVTASLYKRAQKGVVSP VSADSIADVRTNDEPLFEYFTNLALVRPPGNKDRVWFEEFLAAEIE AIKSPHQFFQDTIKREQAVAQIKAKLDAMDGGQGRAASGEEDALPGF EGDDRITLLRELVTDTLGYLAEADASTSPGGKIEYSIQERTVIRGFAEVK RRWRDLVEKGKATEDALLKVLAEEQTEHRDDFGSATLYRELAKPKF QPIWRDPGTQPWHADDPRAWLEYRELGRELEDKQRPPIRFTPVHP VHSPRFFIFPKKKGGGRFGTVHEPGQLRVMAGIVAQTQHGWEVVP VRITYAAPRLRRDQLRDDVETDLESRPWLQPMMQALGLPEPDTAD FSNCRVTLQPSAPDDIQLTFPVDVSADKLTTAIGKAARWAKQFNLF DGDNFYNASLRWPHEKKPSKPPVPWHEALDNFSVLAADLGQRCA GAFARLEVRANDDFAGKPSRFIGETPGKKWRAALVAAGMLRLPGE EQTVWRPGATGPNFHTELSGSRGRMARPHADDADLLRAFDCE ESLMPADWRTSLSFPEQNDKLLVAARRYQSRLARLHRWCWFLTDE KKRQTALDEIREAEDMPAADDPQLTDKLRALLQKQAALPGLLVRL ANRILPLRGRSWQWETHPKADCHLLTQTGPALPDVWIRGQRGLS MQRIEQIEELRRRFQSLNQMQRREIGGKPIRRDDSI DPCCPDLLDK LDQIKEQRANQAAHMILAEALGLRLAPPPADKRQLRASRDVHGQY VKSREPVD FIVIEDLSRYRSSQGRAPRENSRLMKWCHRAVRDKLREL CEPFGIPVVETPAAYSSRFCSRSGVAGFRAVEVGPGFDREFPMMML KDREDEGEPRVRLILQVATLNQGRDGKPPRTLLAPLAGGPIFVPIVD KLNAGADIQPALAQADINAAINLGLRAIADPRLWSIHPRCRTLQRQGD QMLTREKRKFGETGQPLAVHRADGVKPDTRNPNFFADISGSLPA WESATLDGQHLLSGRCLRSEIKRQWQRCAEINDRRMNRWMKGE
278	Cas12b	MTELQTRAYTLRLKGIDEKDQSWRDALWKTHEAVNKGAKVFGD WLLTLRGGLDHTLADAEIPGEKGPDRAPTQEERKHRRILLALSWS VESERGAPEEFIVATGKEPAATRNDKVIAALKDILGRNLTEEKISEW

		TEVCTPSLSAAIREDAVWVNRSRAFDEAVKRIGSSLTREEVWDMLE CFFGSRNAYLAPVKISEDESSDGEQEEKAKDLVQKAGQWLSSRFGT GEGADFAKMAAVYAKIAAWAGNAQAGTTGNEVINNLATALREFT PKSNDLKGVLDLISGPGYKSATRNLLKQIANTKTVTREDISKLOETAG EDSEECATKTGSKGKRAYADAILKDVESVCGFTYRIDKDGQPVSVAD YSKYDEDYKWGSSRHKEFAVMLDHAARRVSLAHTWIKRAEAERRK FEEDSKKIMQVPQAAKDWLDAYCAQRSEASGALEPYRIRKRAIQG WKEIIASWKNKPDCKTAEDRIAAARQLQDDPEIEKFGDIQLFEALAED DAQCVWKKEDGTLDPILINYTLASEAMFKKQHFVPSYRHPDAFL YPVFCDFGNSRWELDFSIREAATKLKEIEAKIEKQRQEVHKVQQALE KCENDEKRPKMEERLKEAQKKLQESQNYGEYLHSNNKITMVLFDGT FVKKHIFAWQSKRLTKDLALYQEPSADPKNVVSRADRLGRAVASVG INDAVKVAGLFEQENWNGRLQAPRQQLEAIAQYVEKHGWDNKA KMRASIKWFITFSAKLQSKGPWNEFARKHGLKEDPHYWPHAENE NRTAHSRLILSRPLRLVSLVDLGHRYAAACAVWEALGSEAFKKDIE GKRIIRGDTDENALYCHTEHEANGKKHITIYRRIGADTLPDGAHHPA PWARLDRQFLIKLQGEDEQAREASNEEIWKVHQLENTLGRRTPLID RLIAGGWGYTEKQKARLEVLTLNLGWCPTNKTNDQEEGDEETAILS KPSLLVDDLMSAVRTLRLALKRHGDRARIAHYLITDEKTKPGGVKEK LDKNGRVELLLDALGLWHDLFSSPGWHDEKAKQLWNAYIAGLLPE GELQQAQSVTTSALGGQKQKKEKELRAVAEALYLNSDLCHSLNE VWRKRWEEDDKQWRIYIRWFKDWIMPRGANAKSPAIRHVGGLSL TRLATLTFRRKVQVGFFTRLHPDGTKTETREDFGQKTLDTLEHLRE QRVKQLASRIVEAALGIGSEDKRHWGKKRPRQRIADPRFVPCHAV VIENTHYRPEETRTRRENQIMEWASSKVKKYLSEICQLHGLHLRE VSAAYTSHQDSRTGAPGIRCQDVSLIEFMKSPFWRKQVAQAEKKQ KEGKGDAVERYLCELNQKWKGASEEWRKAGFVRIPLRGGEIFVSA AGHDSPAAGIHADLNAAANIGLRALLDPDWSGKWVWVPCNSST MCPARDKVTGSAAVNPGQPLQVSAQLESDDAAKDTKKRKKKGDG KSKEIINLWRDISSYPLEDTRGGTWSNKT VYWNRVQSNVVHILQNQ MKG
279	Cas12b	MPETTQRAYTLRLQGHDPKDASWREALWKTHEAVNRGAKAFGD WLLTLRGGLDHSLADEGAPGQTPTEEQRKQRILLALSWLSVESEN GAPQEYIVPHDRDNESGARQNWKTREALREILKNRGRCDDEIESW CHDCEPSLTSAIRKDAVWVNRSKAFDNAVQSIPNFSREEIWDLLGCF FVSSQAYLAPLES PKDDKPDASKKDSSKDLIQSAGQWLSRRFGRGK GLNFARLAETYEAIARWASVANPGDTNDLIADLAKTLNAETPELDGI LKVVSGPGHKS KTRNLLRSLSAVNHITKDTLQRLKDTANEDAKKAKL KKGEKGHRAYAYKVLEAVEDACGFTYLQEGDRAKHCEFAVMLDHA ARRVSSLHTWIKRAEAERRRFEIDTKKKDQLPPSVKEWLDTYCQKRS

		KETGAVEPYRIRRGAIEGWKEIVEAWSKAGTTTAEDRKHEARRLPD NPHIDKSGDIKLFEDLALEDALPVWHANGDPNNPPDPQLLDYVEG SEAEFKKRAFKVPTYCHPDPLVHPVFCDYGCSRWNVSFAIQPVKKQ KLSSEEKLPAGLLDLLHGTAIRPVALRWQSKRFARDLALNTDSSD KPNEVTRADRFGCALAKCPSSQKIRIRGLFEEKYWNGRLQAPRPELT ALAKRVAKYGWDDKKARKLRNSLNWFITFSANLRPSGPWEEYTKYAE KAFSSNASAKPSVSRGGFWVHASPNKRGKMAQLRLCRLPELRLVS VDLGHRYAAACAVWETLSKSAFEQEIHERKILRGGTGPNDLFCHTQ HDTNGQSKVTIYRRIGADTLPNGTPHPAPWARLDRQFLIKLPGEERE ARKASPTELANVEKLEKELGLKTSNRVKRIDDLMSTDLTRVROALR RHSLRARIAFNLATLRDQSDGDEESQSKQKRDTRWNNTVKIWHSL ESNEWTDDWAKALWDELGPLSDPQKADDAEWLKLAAEFYTRW QEDEQTWRELRWLRWILPRGSQAASQKGSIRHVGGLSLTRLATI KTLYQVLKAYHMRKPDNSRKNIPAEGDEALQNFQKILDDLEHMR EQRVKQLASRIVEAALGLGRMKQVTIGKDPKRPREPVDQSCHAVVI ENLTHYRPEKRQTRRENRLMDWSAAKVKKYLKECCQLHGLHLVE VSASYTSRQDSRTGAPGIRCQEVPLTDFLKKNFWREQVKQAKQRLS EGKANARDRYLCQLNERWGNAPAPVTQTAIRLRIPLNGGELFVSAD QNSPASKGIQADLNAAANIGLRAITDPDWPGAWWYVPCANTFK PVKDKVAGSAAIDSNVSLKKDSPNSEKPASDRKSRTSKSMINLWCD TSSKSLSEKDQWQESAPYWEDVAARTINILQASLACSTTNSQ
280	Cas12a	MKSLAQFQNLALQKTLRFELKPEGHTRETFRNWLEEIEKEQASENE NIVYQDLLRAKKYEKIKIILDEYHKDFIEQALAYANLTELEKYEELRKS NRTSEEEEFENTKESLRKQIANIFIKNPNTVQERWKFLFSKKLIQNE LIVWVKGNLYELLSEKLKNEFPDESSIISTIEDFKYFTTYFRNYHENRKNL YSNEDKFSTIAHRLIHENLPKFIDNIAIYQKAKAVLNINEVEKELGLPED TLDKIFSLDFFSKALTQKGIDQYNYFLGGKTENEVKKIKGLNEFINLYN QQQQDKNQRLPFLKVLYKLPLFERTSTSFREFIENDRDIERIGKFYY NDLKQYRDDSQGDTTDLISGINTLLRHVHDYRDGLYVNGGITLTQIS QKIFGSWSYINNALAYFYDTYIDASGVDHQGERKPKKQKQIQEKT WLKQKQFPVILVEKALSEYKSIETNEDLKTRISDTTLCDFFKRCGNDD NGQDLFDRIEARLREKNEEGYSLEDLLKKEFTTERKLMQDKTKTLIK NFLDVIQGDKDDITAGLLHFVKCLIPRTEISEKNELFYSGMEKYLNILS EVTPLYNKARNYLTQKPYSIEKVKLNFENSTLLDGWDENEESDNSCV LLRKRGYYYLGIMNKKHNMIFDRKIYPKATEGEAYYEKMIYKLLPGAY KMLPKVFFSEKNIDYFKPSEELRIRNTASYSKNGQPQEGYQKASFSIE DCRKYIDFFKKCIANHWQKFNFNFSPTYYQSIDEFYREIERQGY KIDFVKIPESYINQLIKENKLYLFKIYNKDFSEKKSKGKDNLHTLYWK MLFDEKNLKDVLKLNGEAEVFFRQKSILYNEEIWNKGHHYSELKDR FSYPIISNKRYAEDKFFLHVPITLNFKADGINNVNMMVNEFIKDNRDI

		HIIGIDRGERHLLYVSVINQKGDIVEQCSLNEIVTEYNGKIFKKNYHEE LDNLEKERDRARKDWQTIANIKELKEGYLSHVIHKISKILKYNAIVV MEDLNSGFKRGRQKVEKQVYQNFEEKLIEKLNLYLVLKESNVDEPGG VLRAYQLANKFETFKKLGKQSGIIFYVPAAYTSAIDPVTGYIQYLYPLK QADSVEKARKFYSQFKRISYNPHKQWFEFSFDYNDFNIIYHGKSSWT ICTTNTERYMWNRLNNGHGGEEELVYVTNELELLFGEYNIYGDGKD IKQQITDVQDIDVDRTAKQFYKRINELLNLTKLRHNNGKKGADEED YILSPVEPYFDSRFESRKPSMQQTLPINADANGAFNIARKGLLLLERL NQLGVVEFEKTKSNNKKTQWLPHELWVEYAQNHTRK
281	Cas12b	MAYQNGKEQPTVTNQRAYTLRLSGTNDQDSIWRNRLWHTHEAV NKGAKTFGDWLLTMRGGLCHTLAEADVPGKGNKPARHPTPQEIRS RRVVLALSWLSVESQHGAPERHLVSHDLDIATGERKNWKTVEALRE ILHGRCLCKELIDEWANDCRDLSATIREDAVWVNRSKAFDLAAKKI GASLTREELWDFLQPPFANKHGYLQMDTVAGVTNGDSETDAEEAK EDSSEEKAKDLSQKAGQWLSSRFGTGTGADFSRFSKVVEVLAARCG SVAVGVSQVEAIRILAGTLADFSPGSNDIEGMLGLMSGPGYKSATR NILQKINTLQTVSQQDLRLREASEKDALQSKQKVGKGSRPYANAI LQDVEAACGICYAGTGESPARHWQYAVILDHAARRVSMASHWIKR AEEQSRKFEIEKDKLDHVPKDALAWLDAFCARRSSESASDAYRIRR SAVDVGWKQVVAWAALPPKPENQGSSELLSDAESARIQAARELQDT VEKFGDIQLFEALSLTGAKCVWQPDGRPDAPLLDYVAGTDAISKK QRFKVPAYRHPDALLHPVFCDFGNSRWNNYAIHRAPEKLTPAQQL LEKKKAEIDKAELTLAKAGDAAKQANISEKINGLRAAFIQQQEKVAV LNSRHAMTMSLWDGTHIEDTPLIWQSKRFGSDIGQPVEAQPLPVS RADRFGRAVALAQDNVPVIPSGLFDLSDWNGRLQAPRRQLEAIAAI RDSAKLSVNEKQQLVAKRIQSIRWLLTFSAKLQSHGPFIAAAQHGF DWRYGAHGPENKSRQGLAKLILCRPLGLRILSVDLGHRYAAACAVW ETLNAGQIQKACLDAGKEAPGPCTLYLHLKQIANGKEKKTIFRRIAAD TLPDGSPHPAPWARLDQRFLIKLQGEDRDARLATSEEIAAVEQMEN ELGVVRQLKRKGRELLVDELMSDALRTLRLGLRRHGVRRARIAFNLT NKRIRPGGKEEVLDQEGRVLLLTETLLAWYELYTAERWTDEPAREL WNRHIQPLLGATILQNTVNQEDTPSAKRRKLREETSGKLKHVAEEI AKNDSLRCRQLHVLWSAQWQTEDVIWTRRLMMRRWLLPRGVKR NAQLRISIRDVGGLSLTRIASFKSLYQVQKAYQMRPHPEDPRLNIPER GDSRLENFGQVRVLDAMERMRENVRKQLASRIAEALGIGGETGISS KDGSQKKRPTERSSDPRFAPCHAVVIEDLTHYRPDETQTRRENRL MSWSSSKVKKYLGEACELNGLYLREVSPAYTSRQDSRTGAPGLRCN DVTVVEFNNSPFWRKQVGAAEKNQKEGNKGDARERYLLSIEGIRG AANDRDIFRIPVKGGEIFVSACITDGGNNAKKNAPPGLQADLNAAA NIGLRAIFDPDWEGRWWYIPCAATLCPDAKKFIGCKAVDPTKPLR

		VVAEEGAISASGIGSKSGRKKNAATDGTRIVNLWRDPSGAPIHRD VLRSPewQDYAGYWNEVQHRVIRNLKTCYEQTSQQEDPFVSQDA DKPF
282	Cas12b	MKRLAETALADKVKCETNSRPKGERAYANSILHDVESACGFTYRVD KGEQVPVSDYSHYANDYRWGPANHSEFAVMLDHAARRVSLAHT WIKRAEAERRQFEENAKKIDKVPKVAREWLDSLCAERSIVLGALEPY RIRRAVDGWKHVVAAWSKSDCKTAQDRITAARLLQEDPEIDKFG DIQLFEALAEDHAVCVWQRDGEAGKTSQDQLIDYALAAEAFFKKR HFKVPAYRHPEAFWHPVFCDFGQSRWKICFDVHKNRQSRQRAC ANRISRKICFDVHKKRQTLRLSLEVWTGSKMLDMLPCWQCKRLAR DLALGQDHKKDRSCQVTRADRLGRAVSNVARNQEVQILGLFEQY WNGRLQAPRPQLEALGRYIEKHGWDAKAQKSCRAIRWMISFSPRL QPAGPWGKFAEKLQLNPNPKYWPHAEDNKDRGSRSKLILCRPLGL RVLSVDLGHRYAAACAVWEAVDAEQVKEACQAAGHREPNENDLY LHLKRTTKQKKGSGQGVVEETIYRRIGADTLDPCTPHPAPWARLDR QFLIRLQGEEDEARAASNEEVWAVHKLEAELGRTIPLIDRLLGAGW GQTEKQKARLKALRELGWTPANKCQAFNSTDETLRRPSLAVDEL MLDAVGTLRLLALKRHGDRARIARYLITDERTKPGGVKEKLDENGRIE LLQDALIIWHGLFSSPRWRDDAAKQLWNEHIAKLVGQNLVEVSED ASGSERRTKQKQNRKLEAAKALVDDVALRQALHDMWKRRWEE EDREWRRRLRWFKDWVLPREQARKAYSRAETGSSSHPKRRARY AAIRRVGGLSLTRLATLTFRRKVQVGFFTRLKPDGTAKAEKEGFGQ STLDALEHLRAQRVKQLASRIVEAALGVGRIRRFPGVKPNKRPDTPV DKPCHAIWIENLTHYRPEETRTRRENRLMTWSSSKIKKYLAEACQLY GLHLREVTAAYTSRQDSRTGAPGLRCQDVPVKEFMRSFLWRKEVA QAEKKLTAGKGSSYERLLCELNQRWKDNSPGDGKRAELLRLPHKGG EIFVSAAPDSPAARGLQADLNAAAANIGLRALTDPDWPGKWWHVP CNAVTFRPVEDKVKGSAAVKLDQSLRQVAHPQSKDPGAKKSKEIVN LWCDISSLPLEHREWKLWEPYPAYWNNVQCRVIRVLQGGV
283	Cas12b	MANAKVKTTRSYSLSLNAPSDTTDRSPLWHRIFRTHYAICCGAREF GKLLDLRGGLPTSLAQLGEGIAENDRRQTQRGTRRILALGWSVED LDHARNDPHRVQDTAPGSPLDQDLAEKILRKILITKGIKSEEEQSNWI SDCLPALTANIRPDVWVNRAESFAQWQRGTQPGAQPPTPEEAQ QILFSLCGESLVTLLPEQPAAAGQKQPDQETSPDPEEQTDRPPAAP SADDEMDPSNASRGIFGDLFGENAEGKRSRSQKDNFACAVRDFL CANPTPSADAITEFREKQKPREPNPPGPEKYPPEVSTSGAPTAVAKR YRKLLVCAGLWPKSADEGSSRNSAKTKFADPKPEQKTEIQINALDLI

		DACNQAAPADDSGTSPKAGRVFAPAWASNIAEKVASATQMPANA KSLNEFKRLMFALAARRFSQTQSWTRRNEAERHMAAARQDAAVA RLREIDPDHKAQDWLRGYEQRRADQSGSNGEFRITRRMIGEA EAV FKAWAGTNSAAERELKTAVVQTTAEKFGDAALYSEIARNTAAEAV WRSGSAPEILDQWVKLRKAQSDQQRTRVPRFCHPNAFRHPTWCE FGESSKPGVWYAWNPKSKPRKPEVGGEGDGTRRLWVLLPDFNSGI GQAVPLRWRSKRLSKDLGEALQPSDAPIPRADRVSIAAAGLNLEGA NGVPARYRPSLPFSENTKGWNARLQANRTALLHLESKWDAEAAT WRDGGRSLLALKWFTTFSPELAMSEGPGRAIHPKLGWNSEPHSDL NRAQKRGGNAKLILSRLPGLRVLSVDLGHRYAAACAVWETLTTEQ MNAACQAKNHTQPAESDMYVHLAHPTE RVVKSGRKKGQNLIQTT VYRRIAADTLPDGT PHPAPWGR LDRQFLIKLQGEQRPTRAASKNEA DLANALFHRLGLRSDADSENKSRVAVDKLMARTVRVATLGLKRHARR AKIAYALDPNTKAIPGMGGSSAAFTPGDEPHIHLTDALFDWQSLAT DAKWDDAHARSLWNHHIATLPGGFHLENPTPRDESAHEPSRQRQ RSGDDALRATLKP IAEKLSKADRQEVHAAWK KYWGDSDGQSAIVP KVLQGGQRGPEKTTSPASASGWHGKIRWITDWIMGKYLEGCTGHA WKHDVGGLSVSRITTMKS LYQLHKAFAMRATPEKPRGAPEKGESN LGAAQGILTAMESMRQQRVKQLASRIAEALGAGIERRSDNGREL QRP RERVDDPRFAACHAVVVEDLTNYRPDEMQRREN RQLMQW ASSKVKKYLSEACQLHGLYLRGVPAGYTSRQDSRTGAPGVRCGDIPV EELMAAPRWRRQILTAEKTRRENNTGTARDRYILTLDEKYRLLTAEQ RKKTTPARIPVKG GDLFVSADPDSPAASGIQADLNAAANIGLKALID PDWPGRWWYIPCDATTHKPSPERTRGSAAVDCDVPLGPDSTGTPE DRDAKPKKNQRNSKIAGRGQSAIINLWRDPTHLP IKENPSAWCESK KYWNQVEHN VVKVIESKGQKLTQTAEAAATGESASSPPIAPT DVPW
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[0079] Those skilled in the art will appreciate that, given that their amino acid sequences are known, these enzymes can readily be produced (e.g., through culturing of source organisms and/or by recombinant expression/purification, as, for example, may be contracted from any of a variety of commercial sources). Produced enzymes can then be assessed for direct and/or collateral cleavage at varying temperature(s) and/or for other evidence of stability and/or functionality at relevant temperature(s).

Example 4: Thermostability of Cas13

[0080] This example confirms and further demonstrates the thermostability of Cas13 enzymes. This example provides certain thermostable Cas13 candidates for use in improved collateral activity assays as described herein. The thermostability of TccCas13a and ThpCas13a was tested. Briefly, varying ranges of labeled RNA target was incubated with TccCas13a or ThpCas13a; Rnase Inhibitor; T7 RNA Polymerase, MgCl₂ and a crRNA (either in forward or reverse complement orientation). Figure 3A demonstrates the significant activity of TccCas13a at 65°C. The data of Figure 3A also suggests the structure of the crRNA can influence the activity of thermostable enzymes. Further, figure 3B demonstrates that TccCas13a is active across a wide range of temperatures including the range 40°C to 65°C.

[0081] Additional assays were performed with TccCas13a with or without some components to identify parameters contributing to background within the assays. Figure 3C demonstrates that presence of the complex of the Cas enzyme and a crRNA contributes to background in the assay.

Example 5: Exemplary discovery and screening for thermostable Cas enzymes

[0082] The present example demonstrates an exemplary method of discovery and screening thermostable Cas enzyme candidates (*e.g.*, Cas12 and Cas13 enzymes) (Figure 4). Novel Cas12 and Cas13 enzymes were discovered using a custom-built in silico pipeline. In brief, publicly available microbial genomes and metagenome databases were first filtered on the basis of environmental metadata such as sample collection temperature and sequencing read quality. CRISPR repeats were subsequently identified in the filtered genomic datasets using published repeat annotation methods. Next, all coding sequences were annotated in genomes that had CRISPR repeats using published open-reading-frame (ORF) discovery methods, and these ORFs were subsequently classified using a Hidden

Markov Model (HMM) that was pre-trained on known Cas12 and Cas13 enzymes. An enzyme was annotated as a putative candidate if and only if its direct-repeats were conserved (> 95%) and the predicted enzyme had a domain topology consistent with previously discovered enzymes.

[0083] Candidate enzymes were expressed by *in vitro* protein synthesis (*e.g.* PURExpress *in vitro* Protein Synthesis Kit by New England BioLabs) according to manufacturer's instructions. An initial pool of Cas12a candidate enzymes were assessed by endpoint (Figure 5) and kinetic analyses (Figure 6) using no template as a negative control for activity at 52°C. Each candidate was tested with three different guide/target pairs at 52°C (Figure 5).

[0084] A subset of candidates (*e.g.*, 12 candidates) that demonstrated highest activity among the 44 initial candidates at 52°C were selected in combination with their most efficient guide and target for further assessment at higher temperatures (*e.g.*, 58°C, 60°C, 62°C).

[0085] Both endpoint and kinetic analyses indicated a subset of candidate enzymes (*e.g.*, 9 of 12 candidate enzymes) that displayed some activity at 58°C. Of the nine with some activity, five were classified as high activity (RS9, RS12, RS38, RS54, and RS56), and the remaining four were classified as lower activity (RS31, RS39, RS47 and RS50) (Figure 7).

[0086] Both end point and kinetic analyses indicated a subset (*e.g.*, 5 of 12 candidate enzymes) that displayed some activity at 60°C. Of the five with some activity, three were classified as high activity (RS50, RS56, and RS9), and the remaining two were classified as lower activity (RS28 and RS29) (Figure 8).

[0087] Both end point and kinetic analyses indicated a subset (*e.g.*, 2 of 12 candidate enzymes) that displayed some activity at 62°C (RS9 and RS54) (Figure 9).

[0088] While the refined list of 12 candidate enzymes were assessed at varying temperature, four priority candidate enzymes (RS10, RS28, RS38, and RS54) were purified

and assessed for activity at varying temperatures (*e.g.*, approximately 35°C to approximately 65°C). RS54 showed activity at LAMP temperatures (*e.g.*, 61°C) (Figure 10).

[0089] A subset of Cas12a candidates were further examined using three different guide and target sets compared to no template control at both 58°C and 70°C (Figure 11). Cas12bcd was also assessed with all guide/target pairs at both 52 and 58°C (Figure 12). Kinetic analysis were also performed for Cas12a candidate, RS62, which showed activity at 52°C (Figure 13).

[0090] An initial pool of Cas13 candidate enzymes were assessed by endpoint analysis (Figure 14) using no template as a negative control for activity at both 37°C and 52°C. A single Cas13 candidate enzyme (RS73) was identified that displayed thermostability.

Example 6: Exemplary characterization of a thermostable Cas12a enzyme

[0091] The present example demonstrates characterization of an exemplary thermostable Cas12a enzyme, RS9. To determine whether RS9 required use of Thermostable Inorganic Pyrophosphatase (TIPP) for amplification of a target nucleic acid, real time detection of ORF1ab amplification was completed over a range of starting concentrations of ORF1ab (4.5 copies/μL to 4,500 copies/μL) in the presence or absence of TIPP. An exemplary reaction included 30 ng/ul RS9, 112.5 XL-213 (ORF1ab guide), 1x HKFB (ORF1ab) primer set, 1x wsLAMP mix, 125 nM DNase Alert, with or without 1 U Thermostable Inorganic Pyrophosphatase (TIPP) with indicated viral RNA template concentration present. The exemplary reaction was incubated at 58°C for 120 minutes on QS5 with detection in VIC channel. Real-time reactions that did not contain TIPP resulted in no statistically significant amplification of ORF1ab compared to the no template control regardless of the starting concentration of template. Real-time reactions that did contain TIPP, with the exception of that with a starting concentration of template at 4.5 copies/μL,

demonstrated significant amplification of ORF1ab compared to the no template control, suggesting RS9 requires use of TIPP for amplification (Figure 15).

[0092] Specificity of RS9 was also assessed using real-time analysis. Amplification was conducted with a starting concentration of 4,500 copies/ μ L ORF1ab template and either primers and guides specific to ORF1ab or non-targeting primers with an ORF1ab guide. Each reaction condition was also conducted in the presence or absence of TIPP. An exemplary reaction included 30 ng/ μ L RS9, 112.5 XL-213(ORF1ab guide), 1x HKFB (ORF1ab) or CFB (N) primer set, 1x wsLAMP mix, 125 nM DNase Alert, with or without 1 U Thermostable Inorganic Pyrophosphatase (TIPP), with 4,500 copies/ μ L viral RNA present. An exemplary reaction was incubated at 58°C for 120 minutes on QS5 and detected in VIC channel. No amplification was detected for reactions containing non-targeting primers and/or no TIPP. Robust amplification was detected in reactions containing ORF1ab primers, an ORF1ab guide, and TIPP, indicating RS9 is specific for its target and requires TIPP for amplification (Figure 16).

[0093] RS9 collateral cleavage activity was assessed using 100 nM of single stranded DNA target and DNaseAlert or RNaseAlert as reporters. A no target condition was utilized as a negative control. RS9 was unable to cleave DNaseAlert, resulting in intensity measurements significantly above no target control conditions. RS9 was able to cleave RNaseAlert, resulting in measured intensity similar to that of the no target control conditions, indicating RS9 has RNA-specific collateral cleavage activity (Figure 17).

[0094] RS9 collateral cleavage activity was further evaluated alongside known Cas12a, LbaCas12a, using ORF LAMP product as target and either RNaseAlert, PolyrA, PolyrC, or PolyrU reporters. A no target condition was utilized as a negative control. Both RS9 and LbaCas12a were able to cleave RNaseAlert more efficiently than either PolyrA, PolyrC, or PolyrU (Figure 18).

Example 7: Exemplary characterization of a thermostable Cas13a

[0095] The present example demonstrates characterization of an exemplary thermostable Cas13a enzyme, TccCas13a. To determine optimal temperature for

TccCas13a activity, a Cas reaction was conducted over a range of temperatures using 10nM target and RNaseAlert as reporter. A no target condition was utilized as a negative control. Temperature profiles suggest TccCas13a shows highest activity at approximately 62°C (Figure 19).

[0096] To determine whether TccCas13a could be activated by ssDNA in addition to RNA, a Cas reaction was completed at 62°C with RNaseAlert as a reporter. Different targets were utilized at different concentrations (*e.g.*, 10 nM, 100 nM, or 1,000 nM ssDNA or 10 nM RNA). A no target condition was utilized as a negative control. Results indicated that TccCas13a can be activated by RNA, but cannot be activated by ssDNA even at the highest concentrations of ssDNA template at 62°C (Figure 20).

[0097] TccCas13a activation by ssDNA was also assessed at 58°C. TccCas13a was activated at 58°C in the presence of 1 nM, 10 nM, and 100 nM RNA target compared to no target control, while TccCas13a activation by ssDNA at 58°C was only detected when 100 nM or 1,000 nM of ssDNA target was utilized. 10 nM of ssDNA target at 58°C showed no difference compared to no target control, suggesting TccCas13a activation requires a higher concentration of ssDNA than RNA, similar to that observed for LwaCas13 ssDNA activation. Interestingly, TccCas13a was not activated by ssDNA* at any concentration (10 nM, 100 nM, or 1,000 nM) compared to control (no target) (Figure 21).

[0098] To determine whether TccCas13a showed different specific collateral activity to that of LwaCas13, a Cas reaction was done with two different reporters, RNaseAlert which contains multiple different bases (“NN”) and a “UU”-specific reporter with only two “UU” bases and a DNA backbone. Reactions were conducted at 60°C. LwaCas13a showed no preference for collateral activity of either reporter over the other, while TccCas13a showed increased collateral activity at “NN” sites compared to “UU” sites (Figure 22).

Example 8: Exemplary characterization of additional candidate thermostable Cas enzymes

[0099] The present example demonstrates characterization of exemplary thermostable Cas enzymes, Pal1 (SEQ ID NO. 274), Pal2 low MW, Pal2 high MW (SEQ

ID NO. 275), and Pal3 (SEQ ID NO. 276). Each enzyme was tested with four guides (designated as 342-353) at both 37°C and 56°C in a Cas-only reaction with DnaseAlert as a reporter. Fluorescence signal was plotted vs. time for each reaction (Figure 23). Pal1 showed low activity for two guides at 56°C. No activity was observed for Pal2 low MW or Pal3, while activity was observed for two guides at 56°C for Pal2 high MW. Pal1 and Pal2 activity at 56°C is shown in Figure 24. Additional results of studies with these enzymes are shown in Figures 25-30. As can be seen, Pal1 showed activity for 2 guides at 56°C and 70°C; Pal1 showed maximum activity at 57°C and significant activity to at least 67°C. Pal2 high MW showed activity for 2 guides at 56°C; Pal2 high MW also showed maximum activity at 47-52°C and significant activity up to at least 57°C. No significant activity was observed for Pal2 low MW, or any of Pal3-6 at 37°C, 56°C, or 70°C. Those skilled in the art thus understand that these enzymes are thermostable at least at about 56°C and/or within a range of 56°C and 70°C. These particular exemplified enzymes may also be described as thermoactive as their relevant activity(ies) are dramatically reduced and/or undetected at lower temperatures such as at 37°C. Without wishing to be bound by any particular theory, it is noted that enzymes of thermophilic organisms often may show reduced (or undetectable) activity at such temperatures.

Equivalents

[0100] Those skilled in the art will recognize, or be able to ascertain using no more than routine experimentation, many equivalents to the specific embodiments of the invention described herein. The scope of the present invention is not intended to be limited to the above Description, but rather is as set forth in the following claims: