

# CASX NICKASE DESIGNS, TANS CLEAVAGE DESIGNS & STRUCTURE

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## PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Published Application	20210309981	10/07/2021	2019-011
European Patent Office	Published Application	3841205 A0	06/30/2021	2019-011

## BRIEF DESCRIPTION

Metagenomic analysis of microbial DNA from groundwater samples revealed a new protein, CasX, that prevented bacterial transformation by plasmid DNA when expressed with cognate crRNAs targeting the plasmids. Sequence analysis of CasX revealed no similarity to other CRISPR-Cas enzymes, except for the presence of a RuvC nuclease domain similar to that found in both Cas9 and Cas12a enzyme families as well as transposases and recombinases. The evolutionary ambiguity of CasX hinted at a distinct structure and mechanism for DNA targeting, but without reconstitution of a functional CasX enzyme it was not possible to determine its mechanism of plasmid interference.

UC Berkeley inventors found variant CasX polypeptides that induce programmable, site-specific genome repression in *E. coli* and genome editing in human cells, distinct from Cas9 and Cas12a, which establishes this enzyme family as a third CRISPR-Cas system for genetic manipulation.

## SUGGESTED USES

- » Genome editing
- » Gene therapy
- » Research tools
- » Genomic imaging

## ADVANTAGES

- » Functions under different conditions than currently used CRISPR-Cas proteins
- » Nucleotide sequence encoding the CasX is short, therefore especially useful when using a viral vector for deliver to cell

## CONTACT

Terri Sale  
terri.sale@berkeley.edu  
tel: 510-643-4219.



## INVENTORS

- » Doudna, Jennifer A.

## OTHER INFORMATION

### KEYWORDS

CRISPR, gene editing, genome, CasX, Cas12e

### CATEGORIZED AS

- » **Biotechnology**
- » Genomics
- » **Imaging**
- » Medical
- » **Medical**
- » Gene Therapy
- » Research Tools
- » Screening
- » Therapeutics
- » **Research Tools**
- » Nucleic Acids/DNA/RNA
- » **Veterinary**
- » Other
- » Therapeutics

## RELATED CASES

2019-011-0

## ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ COMPOSITIONS AND METHODS FOR IDENTIFYING HOST CELL TARGET PROTEINS FOR TREATING RNA VIRUS INFECTIONS
- ▶ Genome Editing via LNP-Based Delivery of Efficient and Stable CRISPR-Cas Editors
- ▶ Type III CRISPR-Cas System for Robust RNA Knockdown and Imaging in Eukaryotes
- ▶ Cas12-mediated DNA Detection Reporter Molecules
- ▶ Highly Multiplexed Tagging Methods for RNA Imaging and Other Applications
- ▶ Improved guide RNA and Protein Design for CasX-based Gene Editing Platform
- ▶ Cas13a/C2c2 - A Dual Function Programmable RNA Endoribonuclease
- ▶ Miniature Type VI CRISPR-Cas Systems and Methods of Use
- ▶ RNA-directed Cleavage and Modification of DNA using CasY (CRISPR-CasY)
- ▶ In Vivo Gene Editing Of Tau Locus Via Liponnanoparticle Delivery
- ▶ Methods and Compositions for Modifying a single stranded Target Nucleic Acid
- ▶ A Dual-RNA Guided CasZ Gene Editing Technology
- ▶ CRISPR-CAS EFFECTOR POLYPEPTIDES AND METHODS OF USE THEREOF ("Cas-VariPhi")
- ▶ A Protein Inhibitor Of Cas9
- ▶ RNA-directed Cleavage and Modification of DNA using CasX (CRISPR-CasX)
- ▶ Compositions and Methods for Genome Editing
- ▶ Methods to Interfere with Prokaryotic and Phage Translation and Noncoding RNA
- ▶ Minimal RNA Targeting CRISPR Cas Systems
- ▶ Variant Cas12a Protein Compositions and Methods of Use
- ▶ CRISPR CASY COMPOSITIONS AND METHODS OF USE
- ▶ Single Conjugative Vector for Genome Editing by RNA-guided Transposition
- ▶ Improved Cas12a Proteins for Accurate and Efficient Genome Editing
- ▶ CRISPR-CAS EFFECTOR POLYPEPTIDES AND METHODS OF USE THEREOF
- ▶ Engineered/Variant Hyperactive CRISPR CasPhi Enzymes And Methods Of Use Thereof
- ▶ Methods Of Use Of Cas12L/CasLambda In Plants
- ▶ Type V CRISPR/CAS Effector Proteins for Cleaving ssDNA and Detecting Target DNA
- ▶ THERMOSTABLE RNA-GUIDED ENDONUCLEASES AND METHODS OF USE THEREOF (GeoCas9)
- ▶ Structure-Guided Methods Of Cas9-Mediated Genome Engineering
- ▶ Efficient Site-Specific Integration Of New Genetic Information Into Human Cells
- ▶ Virus-encoded DNA-binding Proteins
- ▶ Class 2 CRISPR/Cas COMPOSITIONS AND METHODS OF USE
- ▶ Compositions and Methods of Use for Variant Csy4 Endoribonucleases
- ▶ Methods and Compositions for Controlling Gene Expression by RNA Processing



University of California, Berkeley Office of Technology Licensing

2150 Shattuck Avenue, Suite 510, Berkeley, CA 94704

Tel: 510.643.7201 | Fax: 510.642.4566

[ipira.berkeley.edu/](http://ipira.berkeley.edu/) | [otl-feedback@lists.berkeley.edu](mailto:otl-feedback@lists.berkeley.edu)

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