GENOME EDITING and the CRISPR CRAZE

Kevin Davies

Executive Editor, *The CRISPR Journal*

Author, *Editing Humanity*

Lexington KY | 02.25.2022

Conflicts of Interest

Nothing to declare.

Kevin Davies

Executive Editor, *The CRISPR Journal*

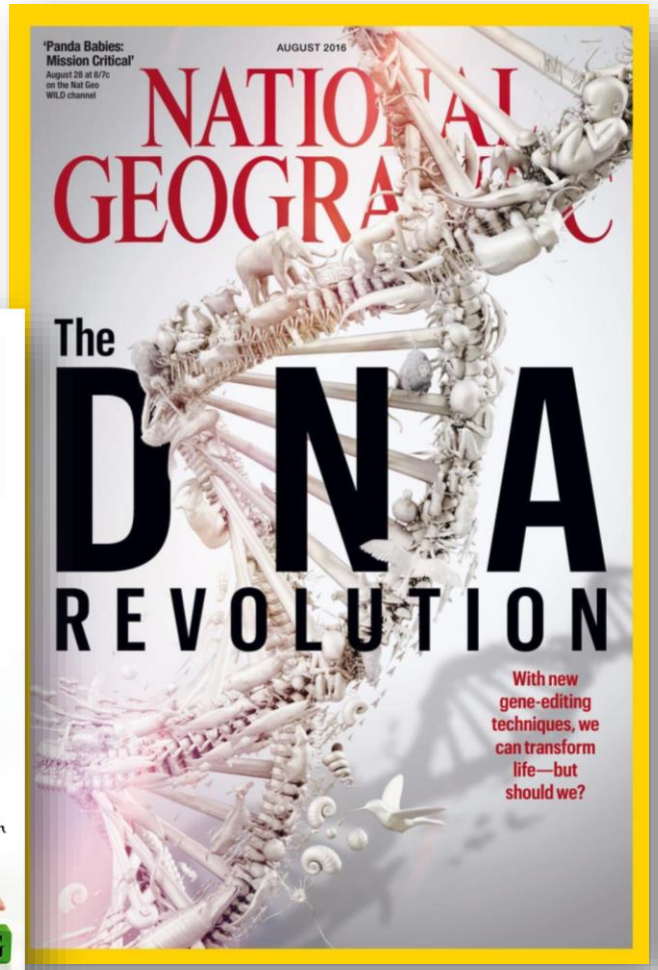
Author, *Editing Humanity*

Lexington KY | 02.25.2022

CRISPR


TIME
The Gene Machine
What the CRISPR experiments mean for humanity By Alice Park


The Economist
How Russians cope with recession
No-go for NGOs in China
Islamic State's taste for slavery
Commodities: the binge, the hangover
India's poet-politicians
Editing humanity
The prospect of genetic enhancement
High IQ
No baldness
Low risk of Alzheimer's, breast cancer and strokes
Perfect pitch
Sprinter
20/20 vision


'Panda Babies: Mission Critical'
AUGUST 2016
NATIONAL GEOGRAPHIC
The DNA REVOLUTION
With new gene-editing techniques, we can transform life—but should we?


No hunger.
No pollution.
No disease.
WIRED
And the end of life as we know it.
The Genesis Engine.


C&EN
CHEMICAL & ENGINEERING NEWS
SEPTEMBER 7, 2015
DISRUPTING PRIONS
Small molecules target progressive diseases P.37
BOSTON IN PHOTOS
Sights from the fall 2015 ACS national meeting P.48
EDITING THE GENOME
CRISPR/Cas9 takes gene manipulation into a new era P.14

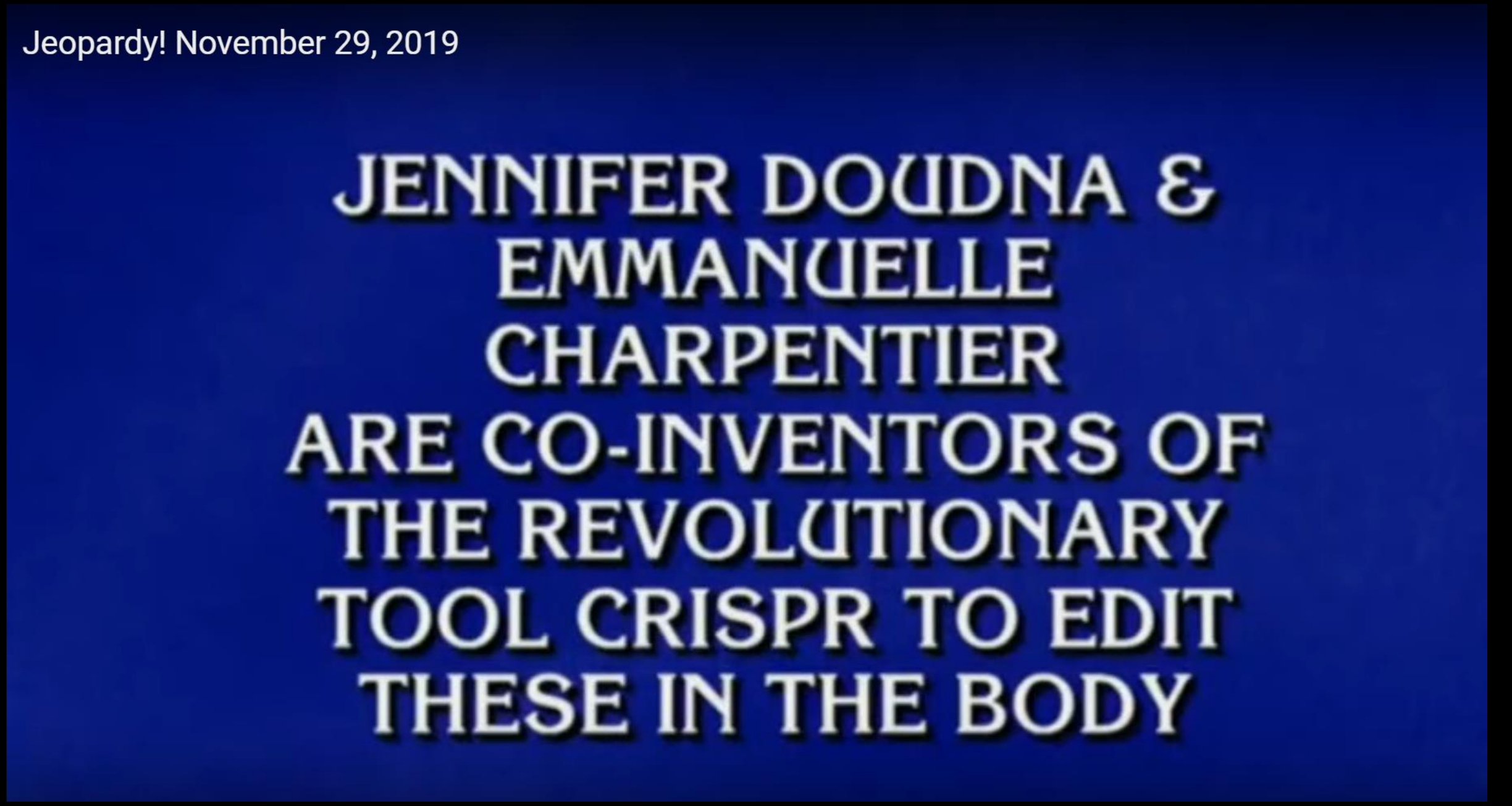

The risks of using CRISPR to edit embryos
ENERGYGUIDE
VWR
60 MINUTES Overtime

In 1993, a breakthrough new technology, known as CRISPR, gave scientists a path to treat incurable diseases through genetic editing.

In 2016, due to its potential for misuse, the U.S. Intelligence Community designated genetic editing a 'Weapon of Mass Destruction and Proliferation.'

"Are you familiar with CRISPR?"

Jeopardy! November 29, 2019



The Nobel Prize in Chemistry 2020

awarded jointly to

Emmanuelle Charpentier

and

Jennifer A. Doudna

"for the development of a method for genome editing."

October 7, 2020

ARTICLES

Highly efficient endogenous human gene correction using designed zinc-finger nucleases

Fyodor D. Urnov[1], Jeffrey C. Miller[1], Ya-Li Lee[1], Christian M. Beausejour[1], Jeremy M. Rock[1], Sheldon Augustus[1], Andrew C. Jamieson[1], Matthew H. Porteus[2], Philip D. Gregory[1] & Michael C. Holmes[1]

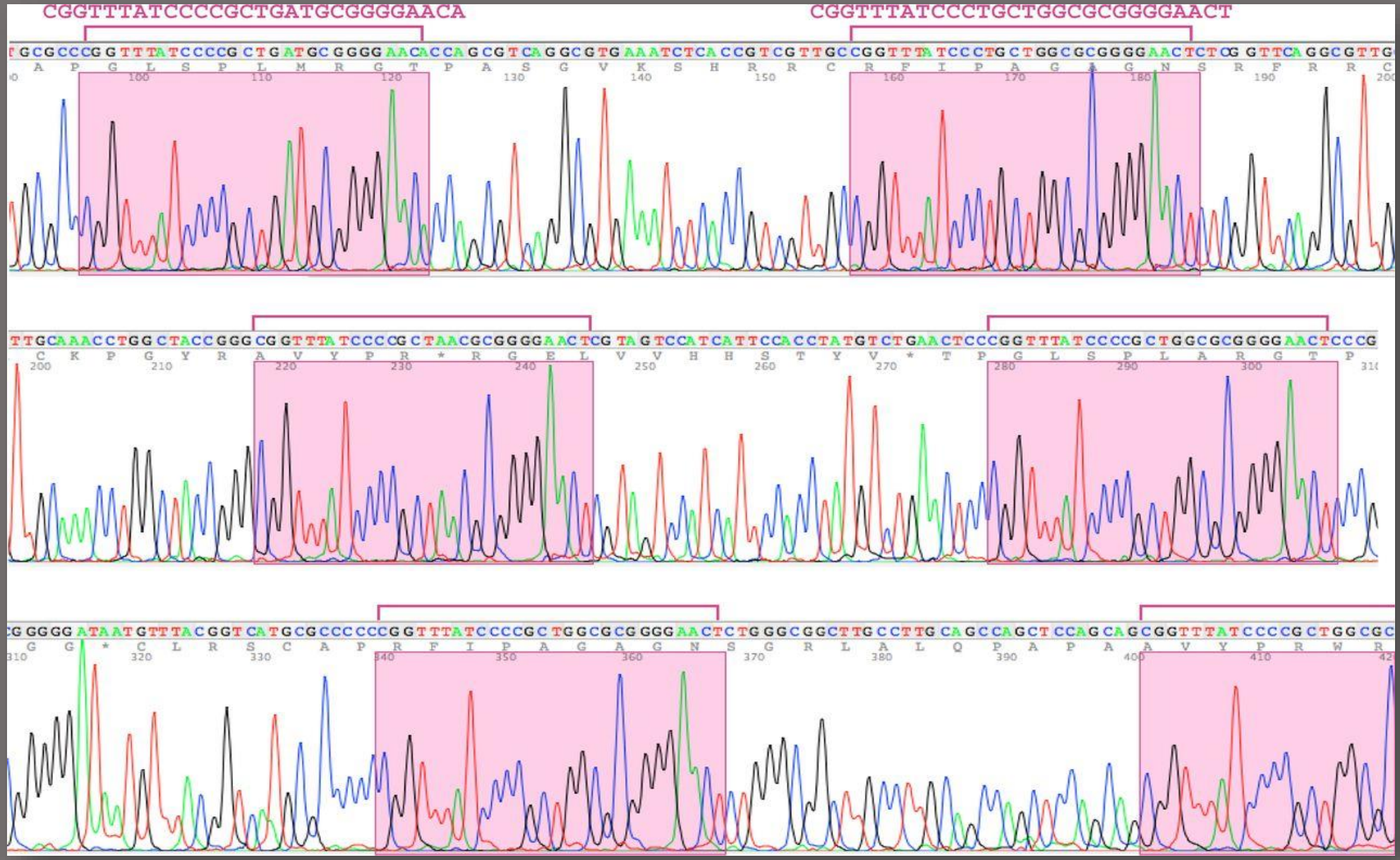
Permanent modification of the human genome *in vivo* is impractical owing to the low frequency of homologous recombination in human cells, a fact that hampers biomedical research and progress towards safe and effective gene therapy. Here we report a general solution using two fundamental biological processes: DNA recognition by C_2H_2 zinc-finger proteins and homology-directed repair of DNA double-strand breaks. Zinc-finger proteins engineered to recognize a unique chromosomal site can be fused to a nuclease domain, and a double-strand break induced by the resulting zinc-finger nuclease can create specific sequence alterations by stimulating homologous recombination between the chromosome and an extrachromosomal DNA donor. We show that zinc-finger nucleases designed against an X-linked severe combined immune deficiency (SCID) mutation in the *IL2R*γ gene yielded more than 18% gene-modified human cells without selection. Remarkably, about 7% of the cells acquired the desired genetic modification on both X chromosomes, with cell genotype accurately reflected at the messenger RNA and protein levels. We observe comparably high frequencies in human T cells, raising the possibility of strategies based on zinc-finger nucleases for the treatment of disease.

Courtesy:
HUMAN NATURE

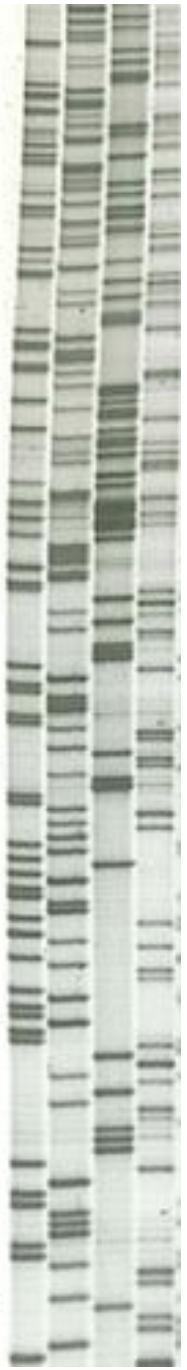
Fyodor Urnov
Innovative
Genomics Institute

Francisco Mojica
(University of Alicante)
Salterns of Santa Pola, Spain

An “unusual arrangement”: CRISPR in *E. coli* (1987)



Ishino Y. *et al.*
J. Bacteriol. 2018



Asunto: **Re: Acronym**
Fecha: Wed, 21 Nov 2001 16:39:06 +0100
De: "Ruud Jansen" <R.Jansen@vet.uu.nl>
Empresa: Diergeneeskunde
A: "Francisco J. Martínez Mojica" <fmojica@ua.es>

Dear Francis

What a great acronym is CRISPR.
I feel that every letter that was removed in the alternatives made it less crispy so I prefer the snappy CRISPR over SRSR and SPIDR.
Also not unimportant is the fact that in MedLine CRISPR is a unique entry, which is not true for some of the other shorter acronyms.

JOURNAL OF MOLECULAR EVOLUTION

Intervening Sequences of Regularly Spaced Prokaryotic Repeats Derive from Foreign Genetic Elements

Francisco J.M. Mojica, César Díez-Villaseñor, Jesús García-Martínez, Elena Soria

División de Microbiología, Departamento de Fisiología, Genética y Microbiología, Universidad de Alicante, Campus de San Vicente, E-03080, Spain

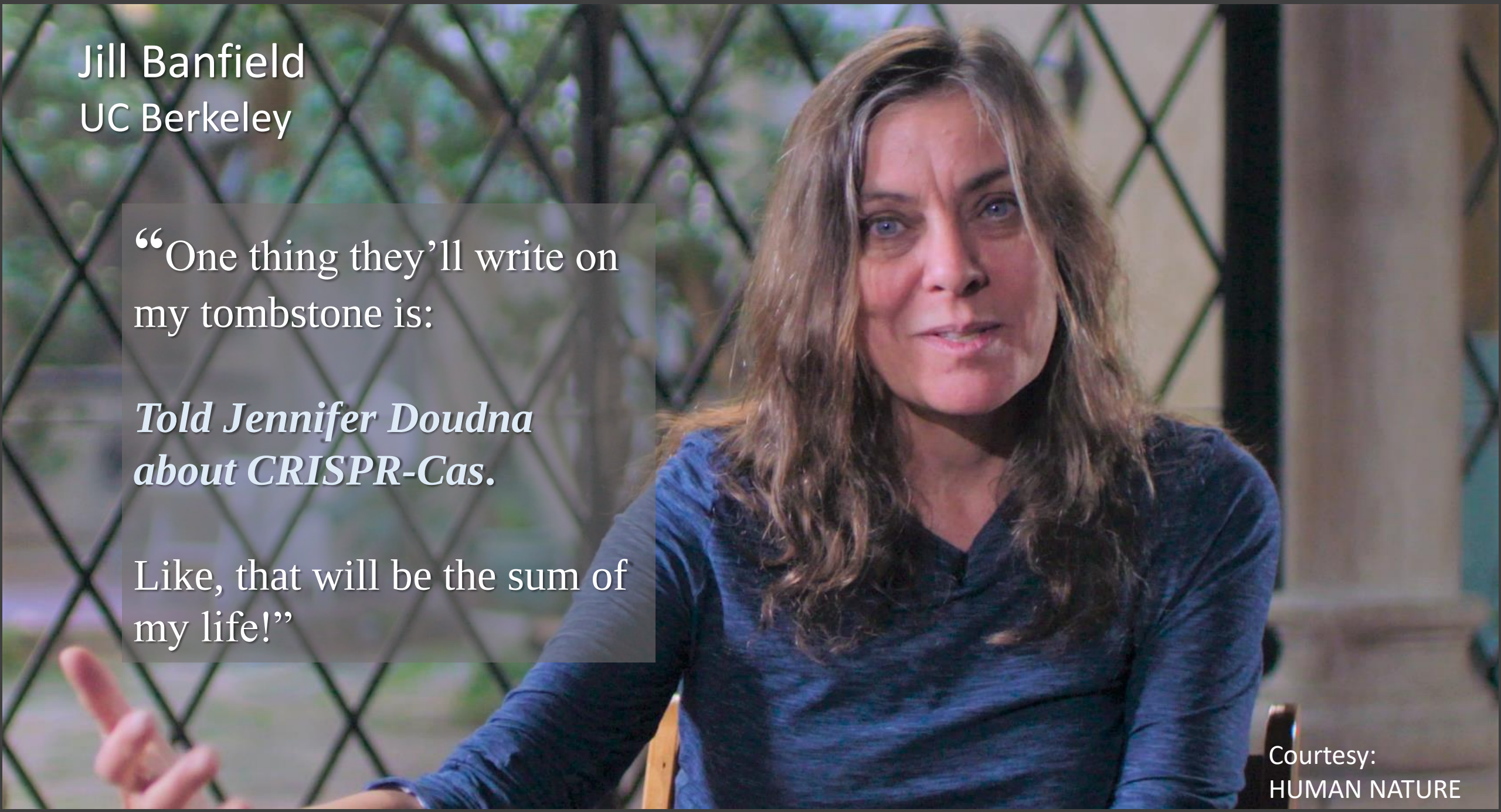
Received: 6 February 2004 / Accepted: 1 October 2004 [*Reviewing Editor:* Dr. John Huelsenbeck]

CRISPR Provides Acquired Resistance Against Viruses in Prokaryotes

Rodolphe Barrangou,[1] Christophe Fremaux,[2] Hélène Deveau,[3] Melissa Richards,[1] Patrick Boyaval,[2] Sylvain Moineau,[3] Dennis A. Romero,[1] Philippe Horvath[2]*

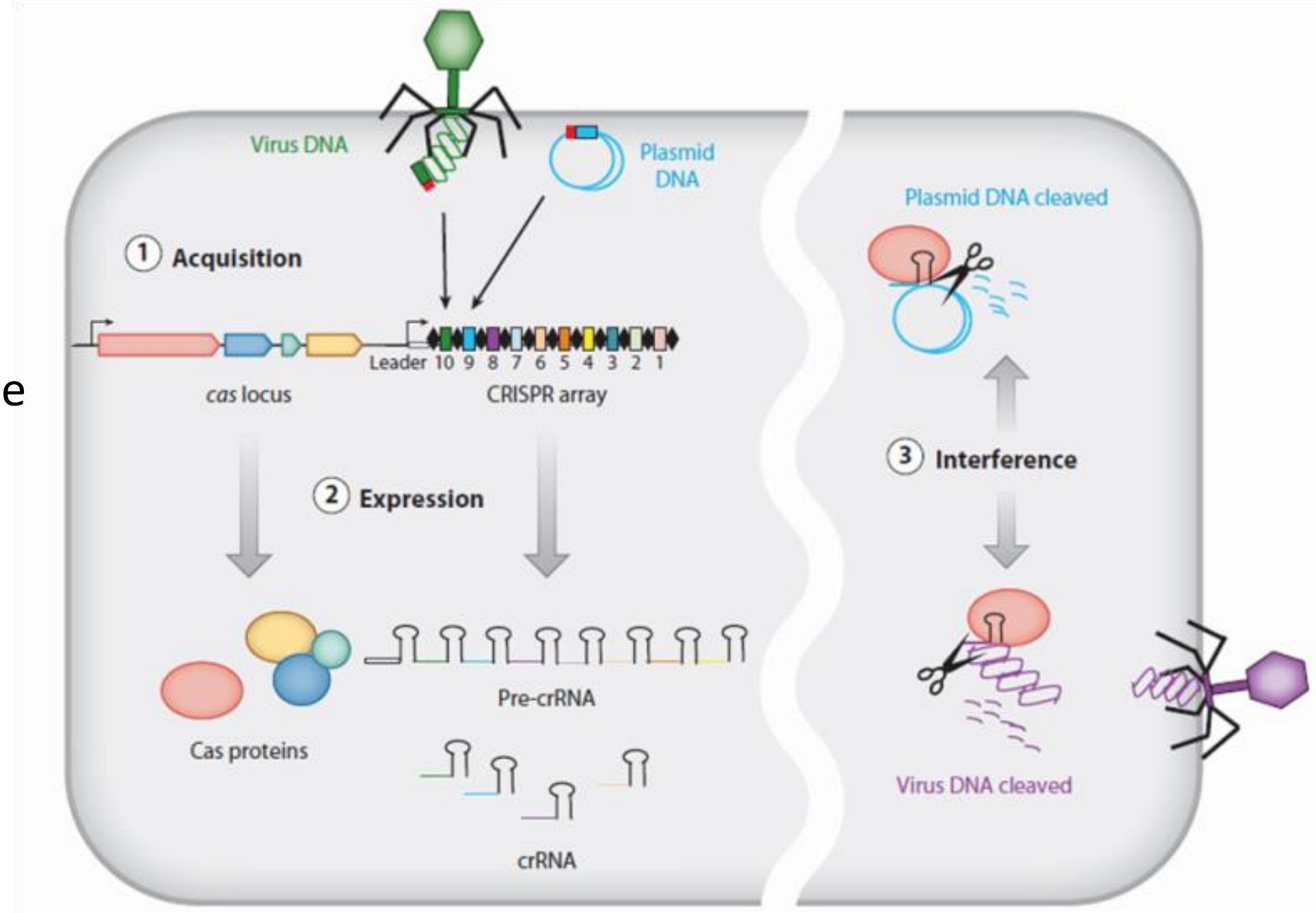
Science 2007


Rodolphe Barrangou (NCSU)


Jill Banfield
UC Berkeley
“One thing they’ll write on my tombstone is:
Told Jennifer Doudna about CRISPR-Cas.
Like, that will be the sum of my life!”
Courtesy:
HUMAN NATURE

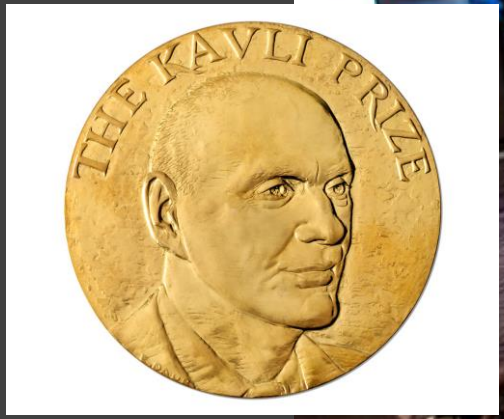
CRISPR

… is a natural bacterial immune defense system that provides a means to recognize, remember and destroy viral invaders.



Team Doudna/Charpentier (2012)

Kavli Prize
Oslo, Norway
Sept. 2018

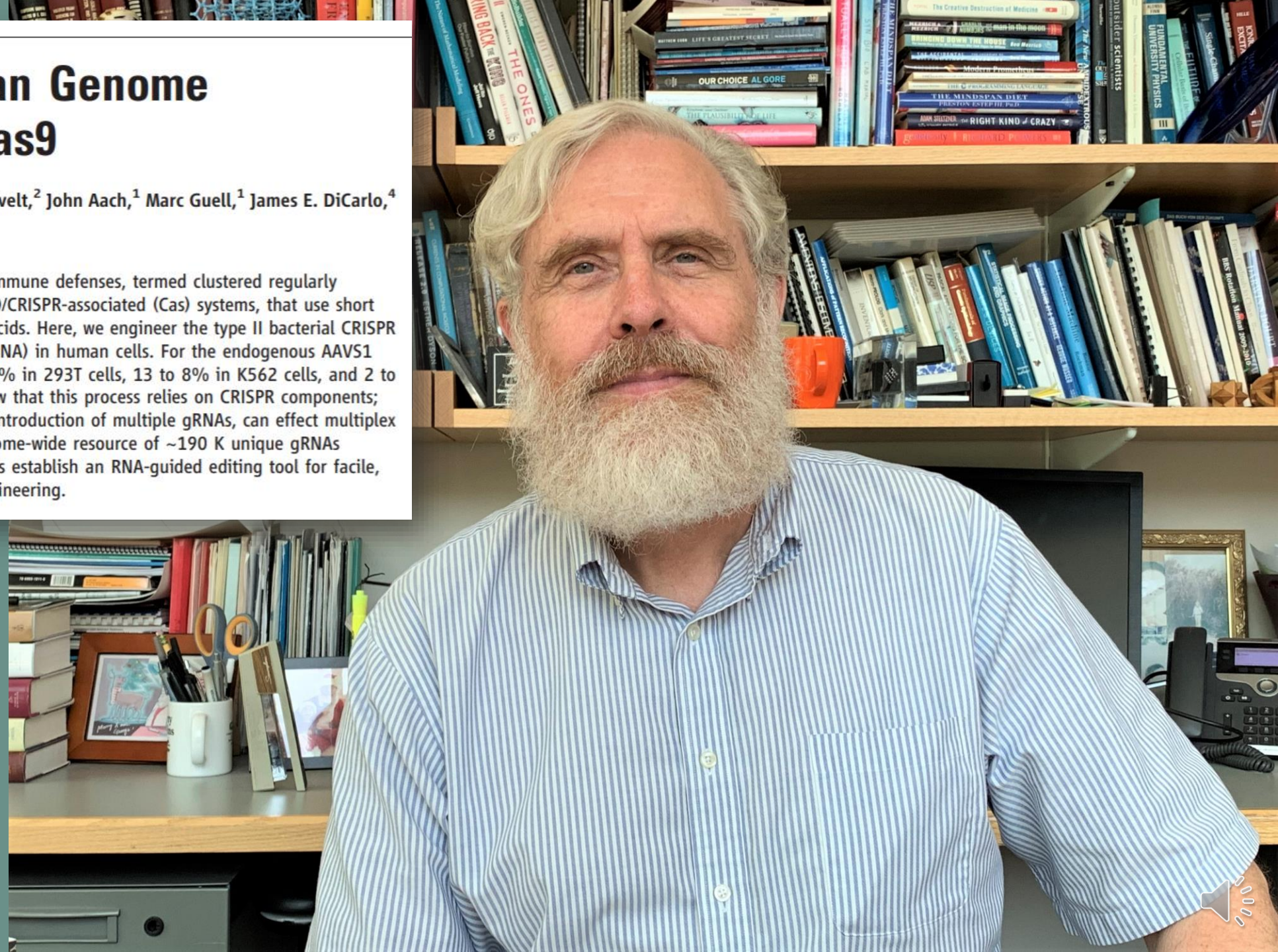


"… for the invention of CRISPR-Cas9, a precise nanotool for editing DNA"

RNA-Guided Human Genome Engineering via Cas9

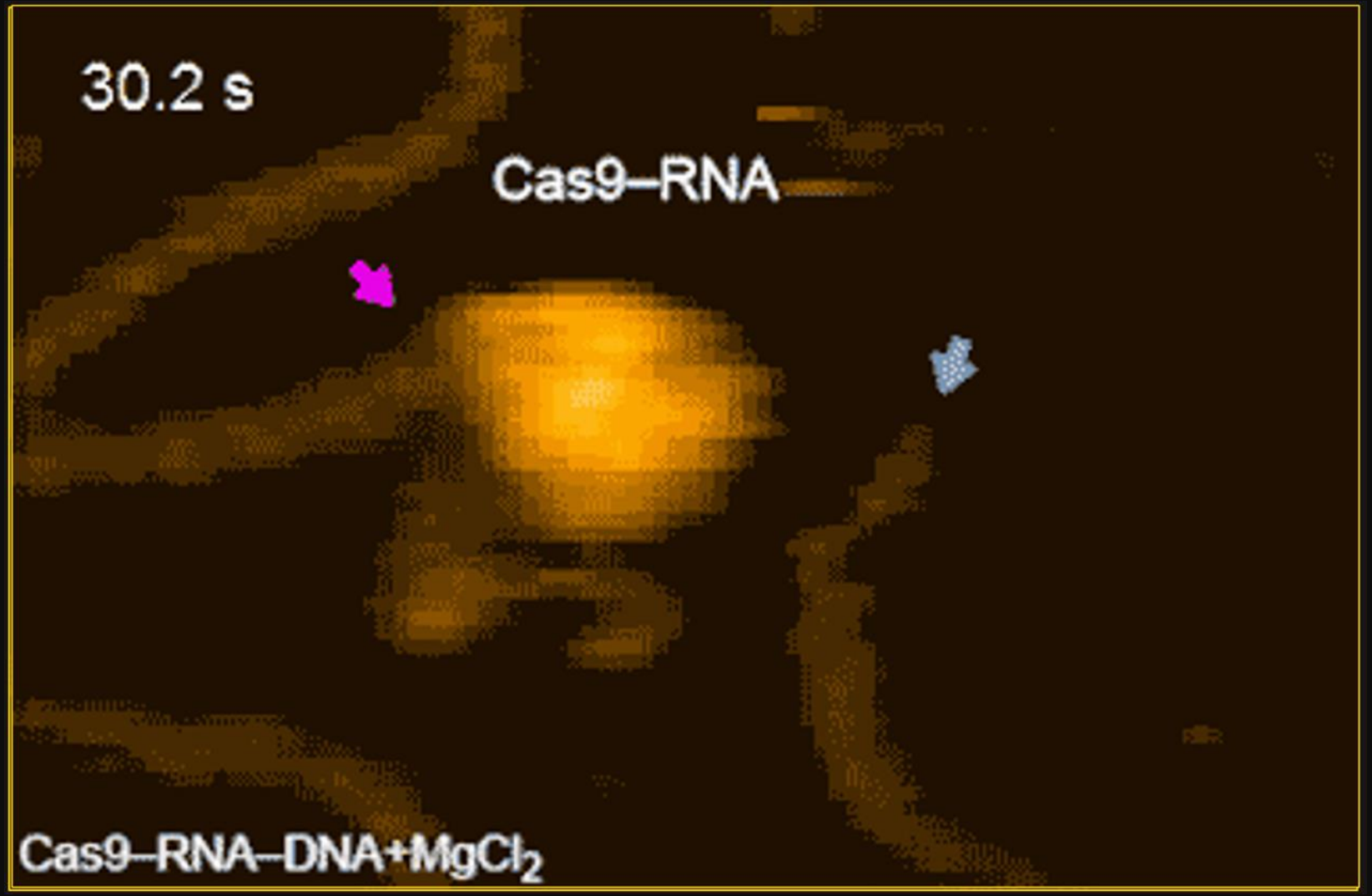
Prashant Mali,[1]* Luhan Yang,[1,3]* Kevin M. Esvelt,[2] John Aach,[1] Marc Guell,[1] James E. DiCarlo,[4] Julie E. Norville,[1] George M. Church[1,2]†

Bacteria and archaea have evolved adaptive immune defenses, termed clustered regularly interspaced short palindromic repeats (CRISPR)/CRISPR-associated (Cas) systems, that use short RNA to direct degradation of foreign nucleic acids. Here, we engineer the type II bacterial CRISPR system to function with custom guide RNA (gRNA) in human cells. For the endogenous AAVS1 locus, we obtained targeting rates of 10 to 25% in 293T cells, 13 to 8% in K562 cells, and 2 to 4% in induced pluripotent stem cells. We show that this process relies on CRISPR components; is sequence-specific; and, upon simultaneous introduction of multiple gRNAs, can effect multiplex editing of target loci. We also compute a genome-wide resource of ~190 K unique gRNAs targeting ~40.5% of human exons. Our results establish an RNA-guided editing tool for facile, robust, and multiplexable human genome engineering.



Lights. Camera. Action… **CUT!**

CRISPR-Cas9 visualized by high-speed atomic force microscopy



M. Shibata, H. Nishmasu *et al*.
Nature Communications 8, 1430 (2017)

Hiroshi Nishimasu (Univ Tokyo)


editas
MEDICINE


Intellia
THERAPEUTICS


CRISPR
THERAPEUTICS


Beam
THERAPEUTICS


CARIBOU
BIOSCIENCES


verve
THERAPEUTICS


GRAPHITE BIO


scribe
THERAPEUTICS


prime
medicine


TESSERA


EXCISION
BIOTHERAPEUTICS


Tome
BIOSCIENCES


SPOTLIGHT
THERAPEUTICS

Meredith Rizzo / NPR

Victoria Gray

Forest, Mississippi

First patient to receive CRISPR gene therapy for sickle-cell disease in the USA

- 46% total HbF
- 99.7% red blood cells contain some of it.

ORIGINAL ARTICLE BRIEF REPORT

CRISPR-Cas9 Gene Editing for Sickle Cell Disease and β-Thalassemia

Haydar Frangoul, M.D., David Altshuler, M.D., Ph.D., M. Domenica Cappellini, M.D., Yi-Shan Chen, Ph.D., Jennifer Domm, M.D., Brenda K. Eustace, Ph.D., Juergen Foell, M.D., Josu de la Fuente, M.D., Ph.D., Stephan Grupp, M.D., Ph.D., Rupert Handgretinger, M.D., Tony W. Ho, M.D., Antonis Kattamis, M.D., Andrew Kernytsky, Ph.D., Julie Lekstrom-Himes, M.D., Amanda M. Li, M.D., Franco Locatelli, M.D., Markus Y. Mapara, M.D., Ph.D., Mariane de Montalembert, M.D., Damiano Rondelli, M.D., Akshay Sharma, M.B., B.S., Sujit Sheth, M.D., Sandeep Soni, M.D., Martin H. Steinberg, M.D., Donna Wall, M.D., Angela Yen, Ph.D., and Selim Corbacioglu, M.D.

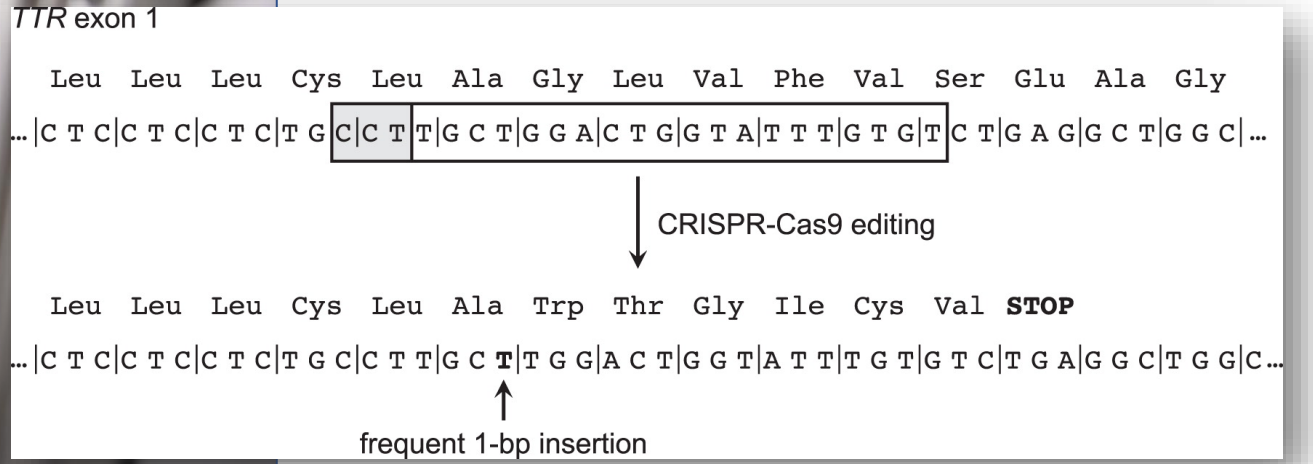
CRISPR Therapeutics | June 2020

In vivo Genome Editing

ORIGINAL ARTICLE

CRISPR-Cas9 In Vivo Gene Editing for Transthyretin Amyloidosis

Julian D. Gillmore, M.D., Ph.D., Ed Gane, M.B., Ch.B., Jorg Taubel, M.D., Justin Kao, M.B., Ch.B., Marianna Fontana, M.D., Ph.D., Michael L. Maitland, M.D., Ph.D., Jessica Seitzer, B.S., Daniel O'Connell, Ph.D., Kathryn R. Walsh, Ph.D., Kristy Wood, Ph.D., Jonathan Phillips, Ph.D., Yuanxin Xu, M.D., Ph.D., Adam Amaral, B.A., Adam P. Boyd, Ph.D., Jeffrey E. Cehelsky, M.B.A., Mark D. McKee, M.D., Andrew Schiermeier, Ph.D., Olivier Harari, M.B., B.Chir., Ph.D., Andrew Murphy, Ph.D., Christos A. Kyratsous, Ph.D., Brian Zambrowicz, Ph.D., Randy Soltys, Ph.D., David E. Gutstein, M.D., John Leonard, M.D., Laura Sepp-Lorenzino, Ph.D., and David Lebwohl, M.D.



Intellia THERAPEUTICS

NEJM June 2021


An epic clash of cultures in ancient Mesoamerica p. 968
Music is another language pp. 974 & 1043
A primordial body in the Kuiper Belt pp. 980 & 998–1000
Science
$15
28 FEBRUARY 2020
sciencemag.org
AAAS
HUMAN
CRISPR
Gene editing meets cancer immunotherapy
pp. 976 & 1001

Carlene Knight

STAT+

BIOTECH

Editas CRISPR treatment improved vision for one patient, but not others, early data show

Reprints

By Adam Feuerstein Sept. 29, 2021

editas MEDICINE

The world's most expensive medicine could save toddlers' lives. But getting it is complicated

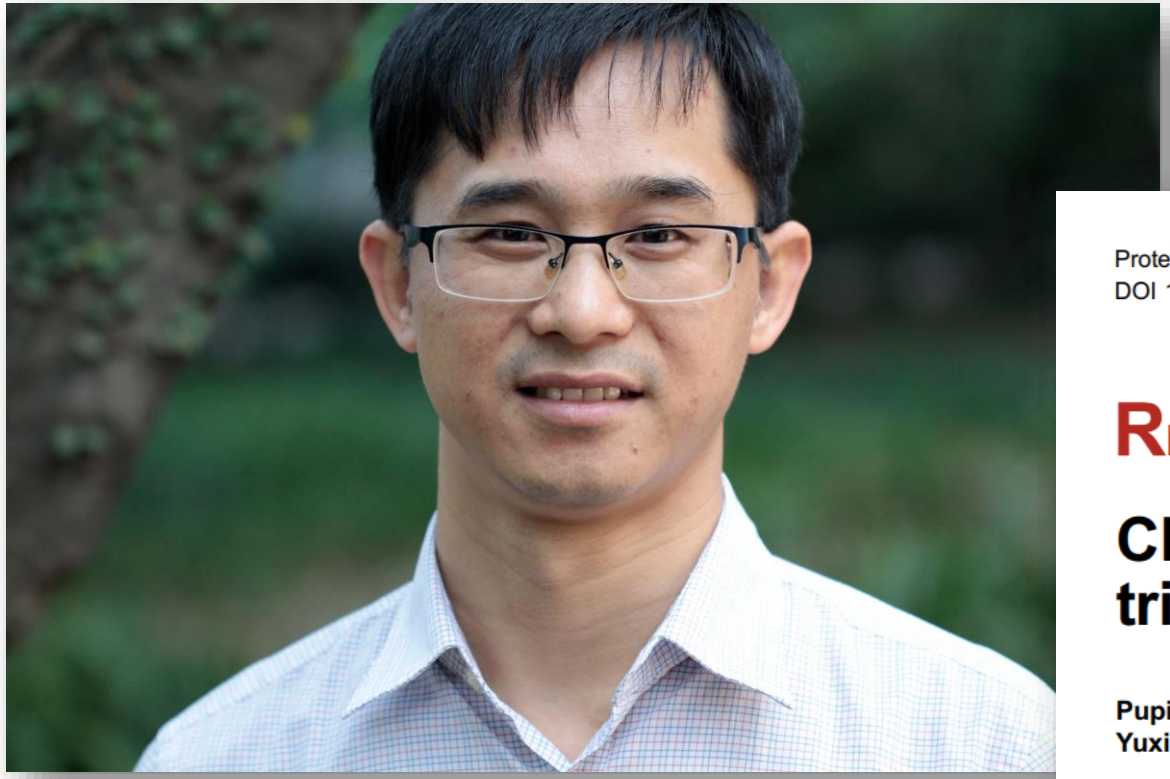
By Jonathan Saltzman -- *Boston Globe 8.8.19*


YOU WERE SO PREOCCUPIED WITH WHETHER OR NOT YOU COULD
JURASSIC PARK
YOU DIDN'T STOP TO THINK IF YOU SHOULD

Heterogeneous Diversity of Spacers within CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats)
Jiankui He & Michael W. Deem
Phys. Rev. Lett. **105**, 128102 – Published 14 September 2010

Chinese Scientists Edit Genes of Human Embryos, Raising Concerns

-- ***New York Times*** (2015)



Huang Junjiu
(Sun Yat-sen University)

Protein Cell 2015, 6(5):363–372
DOI 10.1007/s13238-015-0153-5

CrossMark Protein & Cell

RESEARCH ARTICLE

CRISPR/Cas9-mediated gene editing in human tripronuclear zygotes

Puping Liang, Yanwen Xu, Xiya Zhang, Chenhui Ding, Rui Huang, Zhen Zhang, Jie Lv, Xiaowei Xie, Yuxi Chen, Yujing Li, Ying Sun, Yaofu Bai, Zhou Songyang, Wenbin Ma, Canquan Zhou✉, Junjiu Huang✉

Guangdong Province Key Laboratory of Reproductive Medicine, the First Affiliated Hospital, and Key Laboratory of Gene Engineering of the Ministry of Education, School of Life Sciences, Sun Yat-sen University, Guangzhou 510275, China
✉ Correspondence: hjunjiu@mail.sysu.edu.cn (J. Huang), zhoucanquan@hotmail.com (C. Zhou)

Received March 30, 2015 Accepted April 1, 2015

ARTICLE

doi:10.1038/nature23305

Correction of a pathogenic gene mutation in human embryos

Hong Ma[1]*, Nuria Marti-Gutierrez[1]*, Sang-Wook Park[2]*, Jun Wu[3]*, Yeonmi Lee[1], Keiichiro Suzuki[3], Amy Koski[1], Dongmei Ji[1], Tomonari Hayama[1], Riffat Ahmed[1], Hayley Darby[1], Crystal Van Dyken[1], Ying Li[1], Eunju Kang[1], A.-Reum Park[2], Daesik Kim[4], Sang-Tae Kim[2], Jianhui Gong[5,6,7,8], Ying Gu[5,6,7], Xun Xu[5,6,7], David Battaglia[1,9], Sacha A. Krieg[9], David M. Lee[9], Diana H. Wu[9], Don P. Wolf[1], Stephen B. Heitner[10], Juan Carlos Izpisua Belmonte[3]§, Paula Amato[1,9]§, Jin-Soo Kim[2,4]§, Sanjiv Kaul[10]§ & Shoukhrat Mitalipov[1,10]§

Genome edit
the heterozy
accuracy and
response. In
homologous
the DSB was
embryos car
safety of the
embryos by
applications,

Shoukrat Mitalipov (OHSU)

50p

THE i PAPER · BRITAIN'S FIRST AND ONLY CONCISE QUALITY TITLE

i

The essential daily briefing

THURSDAY 27 JULY 2017

i News.co.uk

Twin Peaty

Swimming hero wins second gold

i world exclusive

One giant step for designer babies

» **Revealed** Era of genetically modified babies moves closer, as scientists prove they can safely alter human embryos

» Inherited diseases caused by defective genes can be corrected in the earliest stage of life, revolutionary technique shows

» Same technology could be used to select stronger muscles or better eyesight, prompting fierce ethical debate

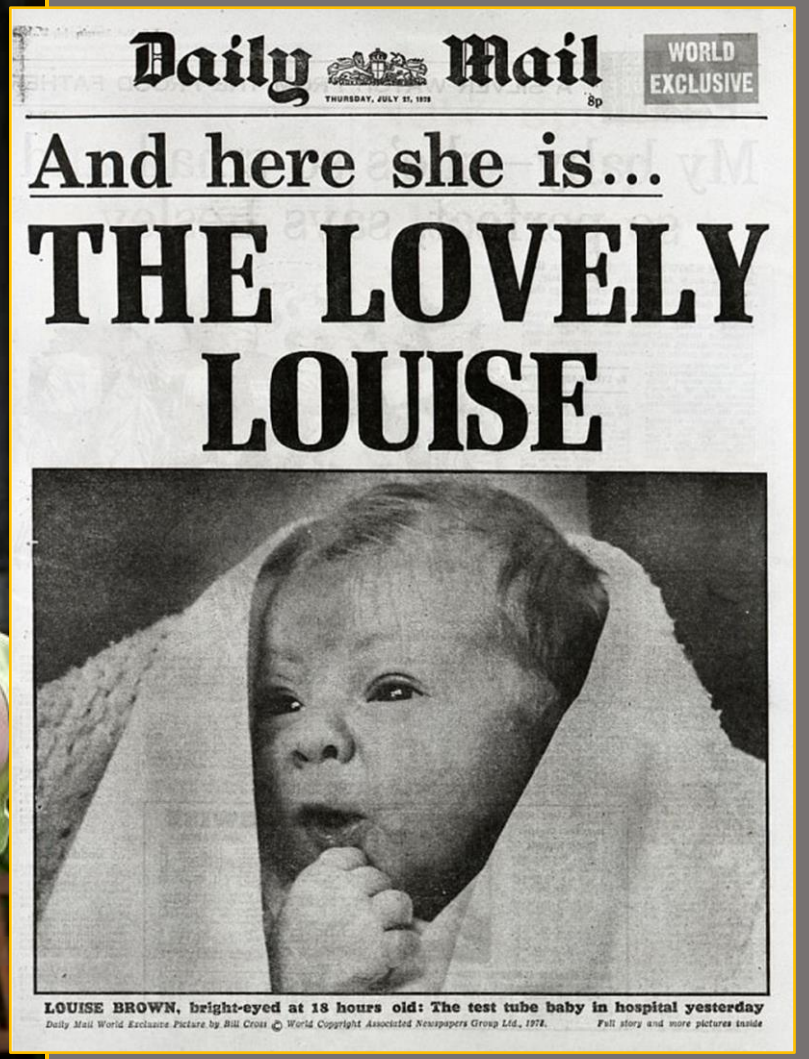
» 'They've done it. The quality of the work is high,' top scientist tells i

» Religious organisations likely to oppose groundbreaking research

SPECIAL REPORT BY STEVE CONNOR, PAGES 6-7

INSIDE CAR BAN BACKLASH P10 | SCIENCE P30 | TV & RADIO P28 | GAMES P44

Robert Edwards / Louise Brown



Daily Mail

THURSDAY, JULY 27, 1978

8p

WORLD EXCLUSIVE

And here she is...

THE LOVELY LOUISE

LOUISE BROWN, bright-eyed at 18 hours old: The test tube baby in hospital yesterday

Daily Mail World Exclusive Picture by Bill Cross © World Copyright Associated Newspapers Group Ltd., 1978.

Full story and more pictures inside

The “AIDS Village”

Wenlou Village

Henan Province, China

“The Baby is Born”

Hi Stephen,

Great news! the baby is born (please keep it in confidential). I am coming to San Francisco this week, will you be available for a meeting? I can come to Stanford in Wednesday, Thursday or Friday. I want to get help from you on how to announce the result, PR and ethics.

Regards,
JK

Jiankui He
Associate Professor
Southern University of Science and Technology (SUSTech)
Lab website: www.sustc-genome.org.cn
贺建奎
南方科技大学生物系副教授

New York Times
April 14, 2019

Antonio Regalado
MIT Technology Review


COURTESY: HE HE LAB, YOUTUBE
HE JIANKUI
BIOPHYSICS RESEARCHER
BREAKING NEWS
PRESIDENT PUTIN BRIEFED ON THE TRAGEDY

HKU November 28, 2018


PAM
Embryo 1
(Lulu)
+1 bp / - 4 bp
Embryo 2
(Nana)
-15 bp / WT
SECOND INTERNATIONAL SUMMIT ON
HUMAN GENOME EDITING
Convened by
The Academy of Sciences of Hong Kong 香港科學院
THE ROYAL SOCIETY
NATIONAL ACADEMY OF SCIENCES
NATIONAL ACADEMY OF MEDICINE

15 Reasons Why

SCIENCE

The CRISPR Baby Scandal Gets Worse by the Day

The alleged creation of the world's first gene-edited infants was full of technical errors and ethical blunders. Here are the 15 most damning details.

ED YONG DEC 3, 2018

7. A few people knew about He's intentions but failed to stop him.
8. He acted in contravention of global consensus.
9. He acted in contravention of his own stated ethical views.
10. He sought ethical advice and ignored it.
11. There is no way to tell whether He's work did any good.
12. He has doubled down.
13. Scientific academies have prevaricated.
14. A leading geneticist came to He's defense.
15. This could easily happen again.

Ed Yong, *The Atlantic*
Dec 3 2018


“ How could Dr. He and [his] team change the gene pool of the human species without considering the need to consult other parts of the human species?”
-- Qiu Renzong

Birth Announcement

Birth of Twins After Genome Editing for HIV Resistance

Jinzhou Qin[1,2,#], Yangran Chen[1,#], Xiaoqing Zhou[1,#], Shuo Song[1,#], Kaijing Chen[1], Rui Chen[1], Yuanlin Chen[1], Hua Bai[3], Michael W. Deem[4], Jiankui He[1,*]

[1] Department of Biology, Southern University of Science and Technology, Shenzhen, 518055, China.

[2] Department of Human Reproductive Medicine Center, Third Affiliated Hospital of Shenzhen University, Shenzhen 518001, China.

[3] BaiHuaLin China People Living With HIV/AIDS Alliance, Cuipingli 10-132, Tongzhou, Beijing, China

[4] Departments of Bioengineering and Physics & Astronomy, Center for Theoretical Biological Physics, and Graduate Program in Systems, Synthetic, and Physical Biology, Rice University, Houston, TX 77005, USA.

*Corresponding Author. Email: hejk@sustc.edu.cn

#Equal contribution

Abstract

Millions of children are born annually with inherited genetic diseases or infectious diseases acquired from parents. The recently developed CRISPR-Cas9 genome editing technique may provide an efficient and cost-effective therapeutic strategy to cure diseases with a genetic component. Genome editing at the embryonic stage has potential to permanently cure disease and confer resistance to pathogenic infections. Here, we report the first birth from human gene editing: twin girls who had undergone CCR5 gene editing as embryos were born normal and healthy in November 2018. Their father was an HIV carrier. We used CRISPR-Cas9 to reproduce a prevalent genetic variant of the CCR5 gene in fertilized oocytes during in vitro fertilization procedure, with the aim of helping the twins to be born with their own natural protection against HIV infection. Genome sequencing during pre-implantation genetic testing and after birth confirmed that the twins' CCR5 genes were edited successfully and are thus expected to confer either complete or partial HIV resistance. No off-targets, large deletions or pathogenic cancer gene mutations was observed. We here bring a novel therapy to enable acquired immunity to HIV and to control the HIV epidemic. We anticipate that human embryo genome editing will bring new hope to millions of families seeking healthy babies free from inherited or acquired life-threatening diseases.

A. Regalado
Tech Review Dec 3, 2019

Residential Surveillance

Elsie Chen
New York Times

TIME 100

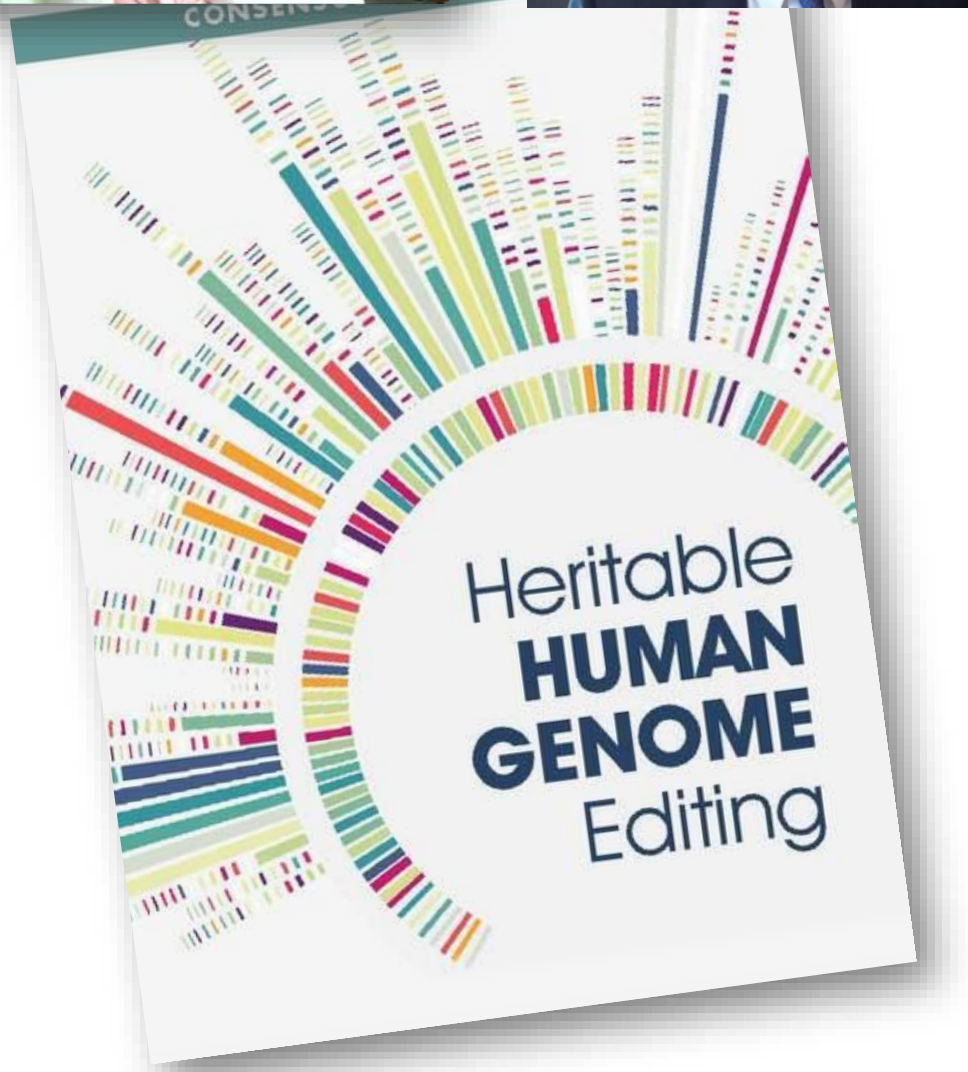
HE JIANKUI

By Jennifer Doudna

Anthony Kwan—Bloomberg/Getty Images

"Going against the consensus… that CRISPR-Cas9 technology is still too experimental and dangerous to use in human embryos, he applied it to forever change the genomes of twin girls.... His reckless experimentation on the girls in China not only shattered scientific, medical and ethical norms, it was also medically unnecessary…

He's fateful decision to ignore the basic medical mantra of "do no harm" and risk the unintended consequences will likely be remembered as one of the most shocking misapplications of any scientific tool in our history."



HHGE Criteria

… should a country decide to permit them, are:

1. Limited to serious monogenic diseases (severe morbidity or premature death)

2. Limited to changing a pathogenic gene variant to a sequence common in the population and non-disease-causing

3. No healthy embryos to be subjected to HHGE

4. Limited to cases where prospective parents have no (or very poor) options for having a genetically related child.

NAS/Royal Society
Sept 2020

Denis Rebrikov
Pirogov Medical University
Moscow

«Вчера было рано, завтра будет поздно. Власть надо брать сегодня».

“Yesterday was early, tomorrow will be late.
Power must be taken today.”

-- LENIN

Andrey Rudakov /
Bloomberg

Who Wants a CRISPR Clinic?

From: "xxxxxxxx"<xxxxxxx>;
Date: Wed, Dec 5, 2018 01:18 PM
To: "hejk"<xxxxxxxxx >;
Cc: "xxxxxxxx xxxx"< >;
Subject: CRISPR Gene Editing Embryology Lab Application Course

Dear He Jiankui,
Congratulations on your recent achievement of the first gene editing baby delivered by your application!
My name is XXXXXXX, and I am the Business Director's Assistant at XXXXXXXX Fertility & Gynaecology Center, in Dubai.
Our Embryologist is interested in partaking in a course regarding CRISPR gene editing for Embryology Lab Application.
Does your facility offer this type of course?

Kind regards,
XXXXXXXXXXX
Business Director's Assistant
XXXXXX

Credit: William Hurlbut

REPORT

Inactivation of porcine endogenous retrovirus in pigs using CRISPR-Cas9

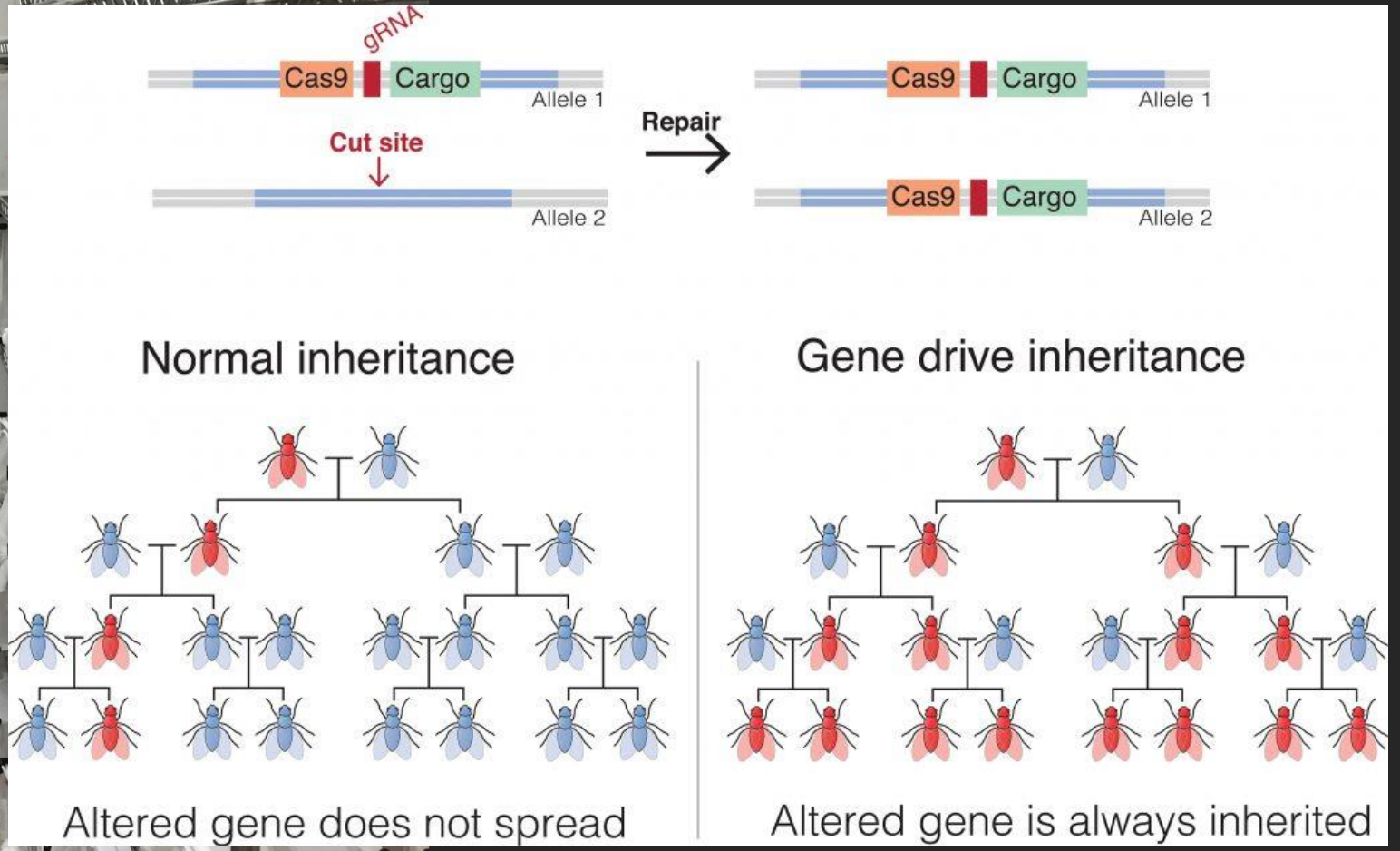
Dong Niu[1,2,*], Hong-Jiang Wei[3,4,*], Lin Lin[5,*], Haydy George[1,*], Tao Wang[1,*], I-Hsiu Lee[1,*], Hong-Ye Zhao[3], Yong Wang[6], Yinan Kan[1], Ellen Shrock[7], Emal Lesha[1], Gang Wang[1], Yonglun Luo[5], Yubo Qing[3,4], Deling Jiao[3,4], Heng Zhao[3,4], Xiaoyang Zhou[6], Shouqi Wang[8], Hong Wei[6], Marc Güell[1,†], George M. Church[1,7,9,†], Luhan Yang[1,†,‡]

[1]eGenesis, Inc., Cambridge, MA 02139, USA.

The UCSD Insectary

Omar Akbari

GENE DRIVES



Beef Barn,
UC Davis

Christie Hemm Klok
Washington Post

Genome Edited Plants

Caixia Gao (Chinese Academy Sciences)

Zach Lippman (CSHL/HHMI)

Tomato is first CRISPR-edited food to go on sale in the world

ENVIRONMENT 24 September 2021

By Michael Le Page

Tomatoes with genes edited by CRISPR technology are now on sale in Japan
Courtesy of Sanatech Seed

For the first time ever, you can now buy a food altered by CRISPR gene editing – at least, if you live in Japan, where the Sicilian Rouge High GABA tomato has just gone on sale.

"We started shipping the tomatoes on September 17," says Minako Sumiyoshi at Japanese start-up Sanatech Seed, which is selling the tomatoes directly to consumers. She says demand for the tomatoes is "not too bad".

"It is a very significant milestone for CRISPR foods," says ...

The first CRISPR gene-edited food has gone on sale in Japan recently, in the form of a tomato packed with an alleged increase in nutritional content.

The Sicilian Rouge High GABA tomato, created by start-upSanatech Seed, sold gene-edited seedlings to any farmers that wanted them earlier in the year, and 4,200 farmers took up the offer. Now, the tomatoes are ripe for sale.

sanatechseed®
For Tomorrow's Children and Earth

Eriona Hysolli
Medium December 2018

STATISTICS

The UN has declared that

1,000,000

ANIMAL AND PLANT SPECIES ARE THREATENED WITH EXTINCTION.

colossal™

According to Leading Scientists;

30,000	6	150	Up To 55,000
species per year on average are being driven to extinction.	Per hour	Per day	Per year

50%

The World Animal Foundation predicts that up to

ONE-HALF OF ALL SPECIES could become extinct by 2050.


David Liu
Broad Institute/HHMI

Behold: Base Editing

GuidePost

Programmable editing of a target base in genomic DNA without double-stranded DNA cleavage

Alexis C. Komor[1,2], Yongjoo B. Kim[1,2], Michael S. Packer[1,2], John A. Zuris[1,2] & David R. Liu[1,2]

Alexis Komor
(UCSD)

Programmable base editing of A·T to G·C in genomic DNA without DNA cleavage

Nicole M. Gaudelli[1,2,3], Alexis C. Komor[1,2,3]†, Holly A. Rees[1,2,3], Michael S. Packer[1,2,3]†, Ahmed H. Badran[1,2,3], David I. Bryson[1,2,3]† & David R. Liu[1,2,3]

Nicole Gaudelli
(Beam Therapeutics)

MEGAN MOLTENI SCIENCE 10.21.2019 11:00 AM

A New Crispr Technique Could Fix Almost All Genetic Diseases

A less error-prone DNA editing method could correct many more harmful mutations than was previously possible.

Beam Therapeutics Cofounder And Crispr Scientist Publishes Research On New Sickle Cell Treatment In Mice

Leah Rosenbaum Forbes Staff
Innovation
I write about the business of healthcare.

David Liu inside his office at the Broad Institute in Cambridge, MA BOSTON GLOBE VIA

Science Contents News Careers Journals

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12K

A 4-year-old with progeria, a syndrome with features of premature aging that stems from a mutated gene MARTIN ZABALA XINHUA/EYEVIN/REDUX

'Incredible' gene-editing result in mice inspires plans to treat premature-aging syndrome in children

By Jocelyn Kaiser | Jan. 6, 2021 , 11:00 AM

GENE THERAPY

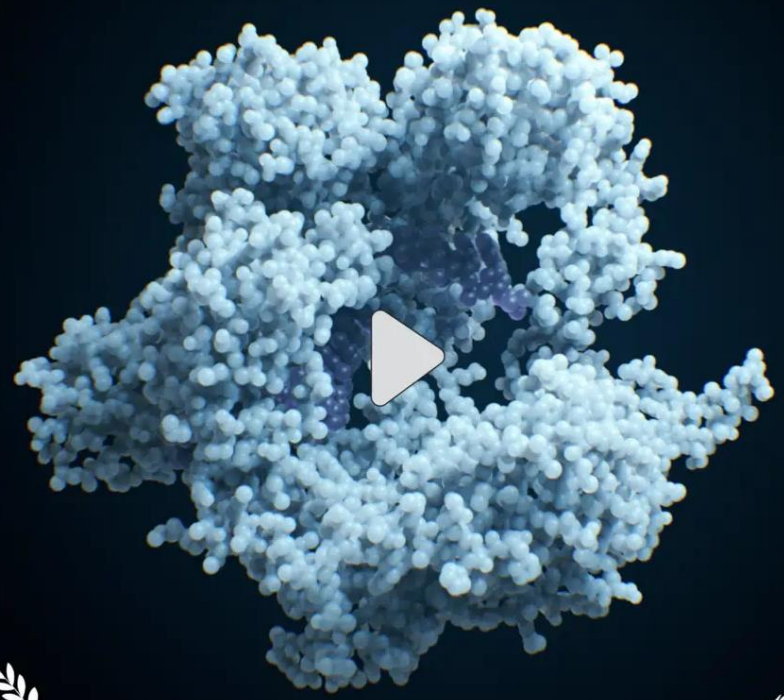
One-time CRISPR hit lowers cholesterol in monkeys

Verve Therapeutics demonstrates long-term LDL reduction for base editor therapy

by *Alla Katsnelson, special to C&EN*

May 19, 2021 | A version of this story appeared in **Volume 99, Issue 19**

HUMAN NATURE



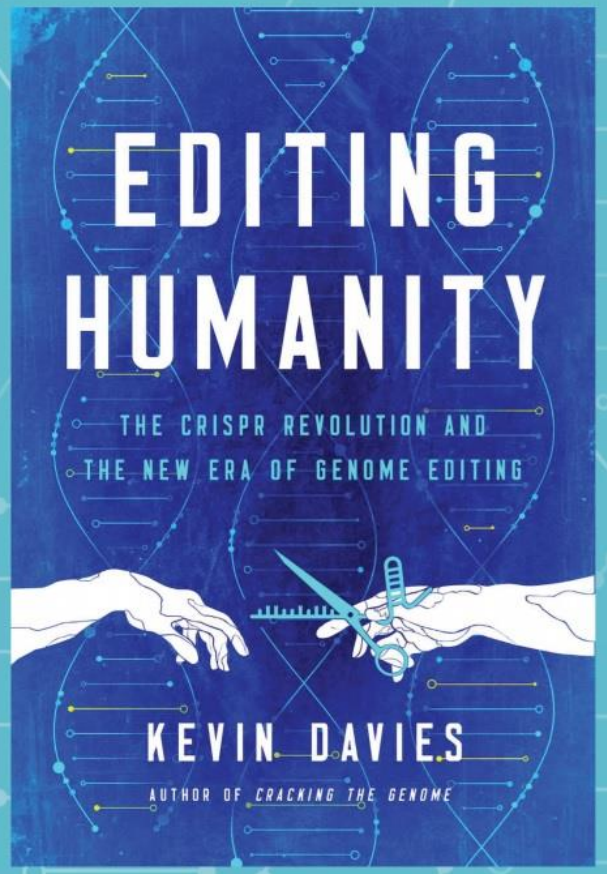
SXSW 2019 FILM FESTIVAL OFFICIAL SELECTION

OFFICIAL SELECTION CPH:DOX 2019

OFFICIAL SELECTION hotDOCS 2019 OUTSPOKEN.OUTSTANDING.

OFFICIAL SELECTION ACADEMIA FILM OLOMOUC 2019 INTERNATIONAL COMPETITION INTERNATIONAL FESTIVAL OF SCIENCE DOCUMENTARY FILMS

THE AUTHOR OF *CRACKING THE GENOME* UNRAVELS ONE OF THE MOST IMPORTANT BREAKTHROUGHS IN MODERN SCIENCE AND MEDICINE.



"With great reporting and deep knowledge, science journalist Kevin Davies takes us to all the frontlines of CRISPR research, from gene editing to improved agriculture. It's the scientific revolution of our era, and Davies gives us a close-up view of all the important players and exciting discoveries."

—**WALTER ISAACSON,**
author of *Steve Jobs* and *The Innovators*

Davies dissects the implications CRISPR will have on our everyday lives and the lives of generations to come.

E: davieskev@gmail.com
T: @KevinADavies

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