



# Gene Editing and Applications

# Gene Editing and Applications

## Session Chairs



Dr. Lei (Stanley) Qi  
Stanford University (US)



Dr. Oscar Ortiz Sanchez  
Merck KGaA (Germany)





DNA is the program of life

Engineering life = engineering DNA

# Cost per Genome

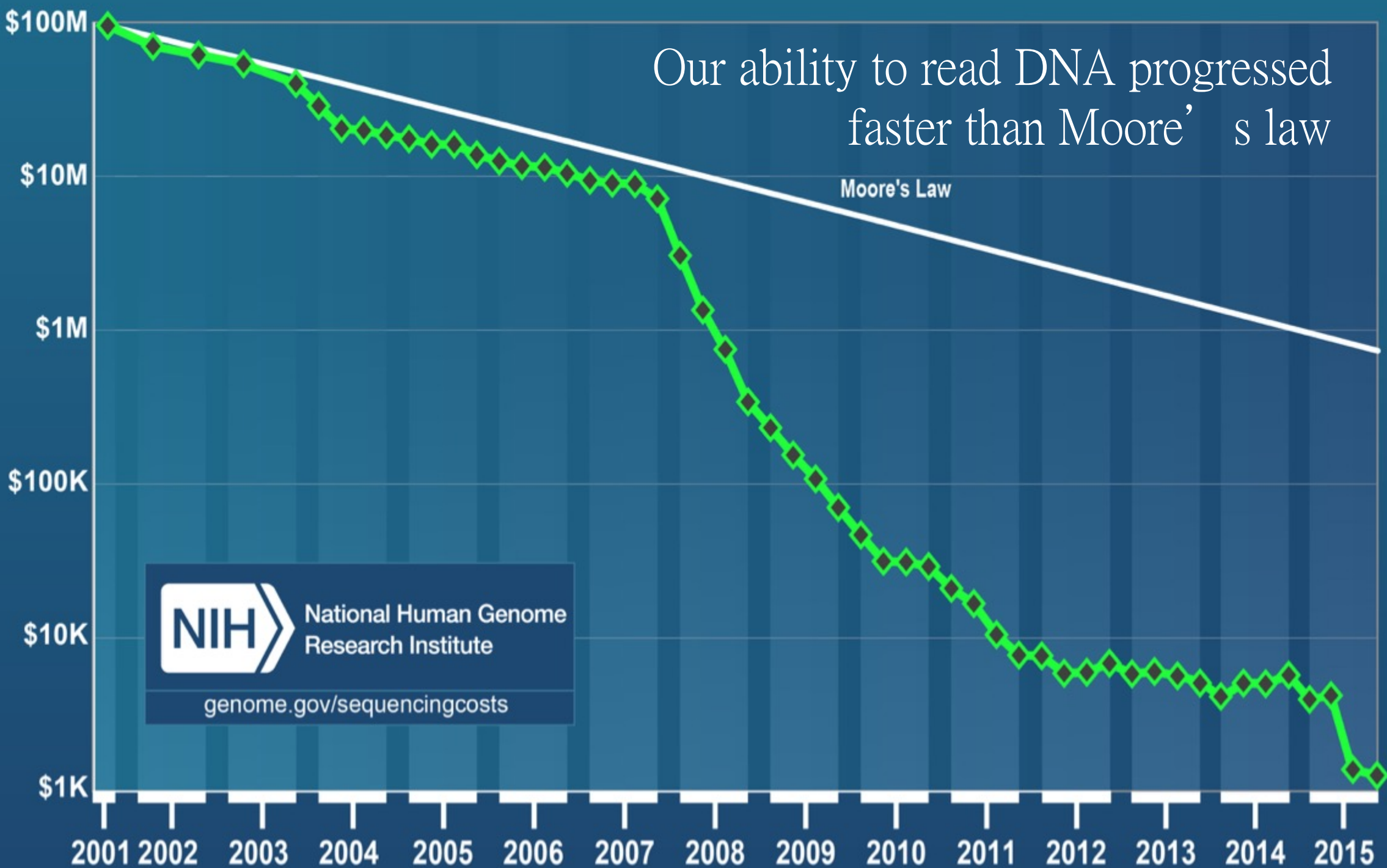
Our ability to read DNA progressed faster than Moore's law

Moore's Law



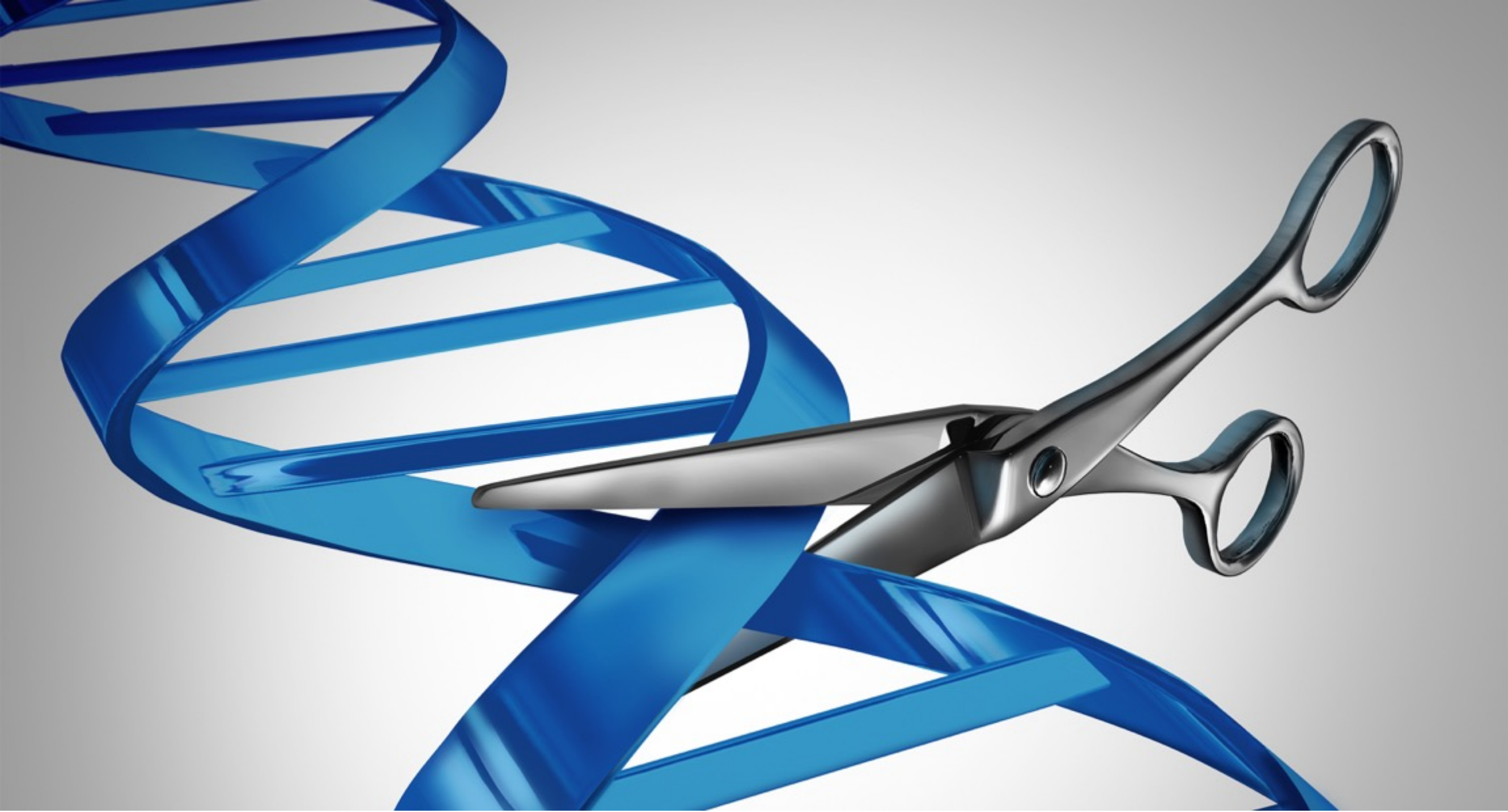
National Human Genome  
Research Institute

[genome.gov/sequencingcosts](http://genome.gov/sequencingcosts)





Besides reading,  
how about writing?

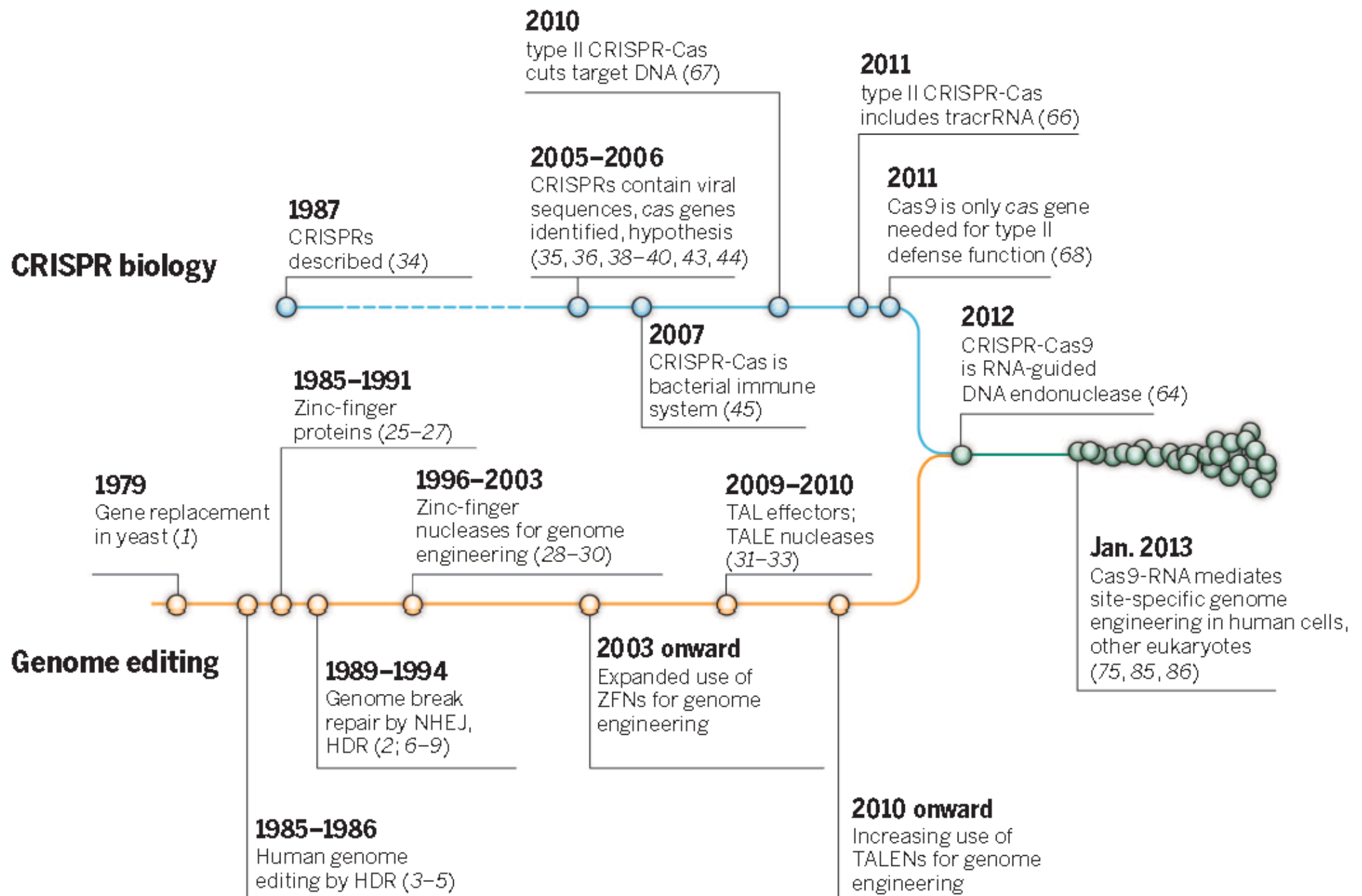


## Gene editing

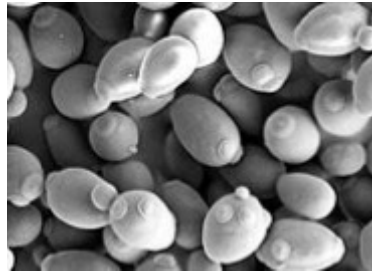
A type of **genetic engineering** in which DNA is inserted, deleted or replaced in the **genome** of a living organism using engineered molecules, e.g. "molecular scissors."



# Genome Engineering Tools: The Force Awakens



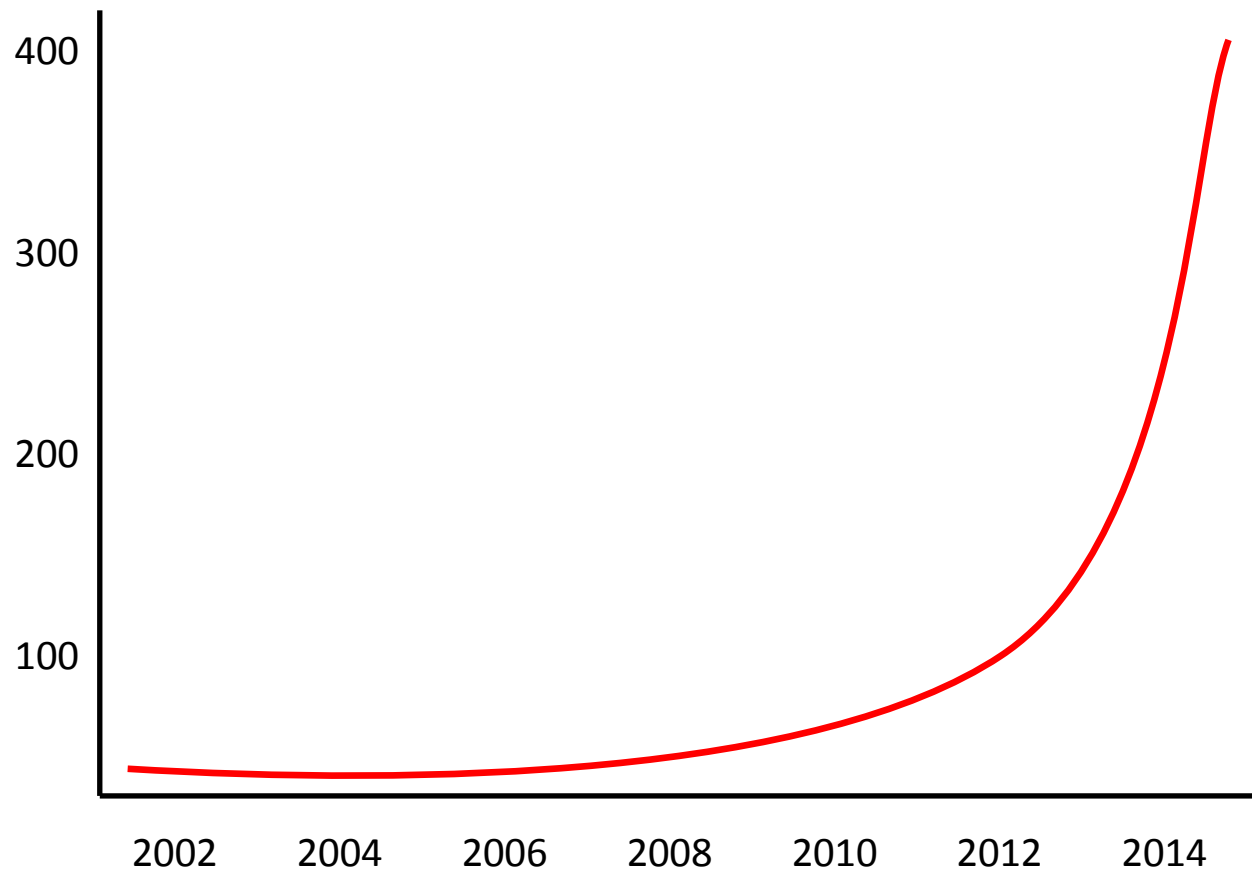
# Genome Engineering Tools: The Force Awakens





# Patent Dispute in the CRISPR Field

#of CRISPR related patent families



NATURE | NEWS



## Bitter fight over CRISPR patent heats up

Unusual battle among academic institutions holds key to gene-editing tool's future use.

Heidi Ledford

12 January 2016

NATURE | NEWS

## Titanic clash over CRISPR patents turns ugly

Accusations of impropriety feature in escalating dispute.

Heidi Ledford

21 September 2016

## CRISPR heavyweights battle in US patent court

The University of California, Berkeley, and the Broad Institute are vying for lucrative rights to the gene-editing system.

Sara Reardon

06 December 2016

by Lee McGuire


















Chief Communications Officer, Broad Institute of MIT and Harvard

Updated February 15, 2017

### February 15, 2017: PTAB issues decision declaring 'no interference-in-fact'

On February 15, 2017, the Patent Trial and Appeal Board declared that the patents granted by USPTO to the Broad Institute, MIT and Harvard concerning CRISPR editing of eukaryotic genomes do not interfere with patent claims filed by UC Berkeley and the University of Vienna.

# Big Pharma is Joining the Game

Who?	Which partner?	When?	\$M
		Feb. 2014	1,110
		Jun. 2014	2,800
		Jan. 2015	Undisclosed
		Mar. 2015	941
		Apr. 2015	~1,000
		May 2015	>737
		Jun. 2015	Undisclosed
		Oct 2015	2,600
		Dec 2015	335

# Our Speakers



**Dr. Montse Fernandez**  
**Takara Bio**

*CRISPR Gene Editing of  
Human Stem Cells*



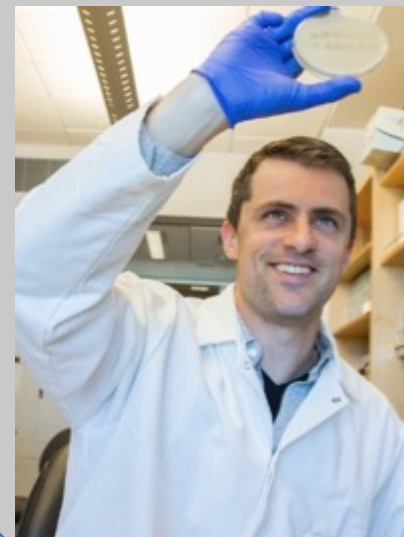
**Dr. Jamal Alzubi**  
**University of Freiburg**

*Gene Editing for  
Curing a Disease*



**Dr. Luisa Bortesi**  
**RWTH Aachen  
University**

*Tailor-Made Plants  
Using Molecular  
Scissors*



**Dr. Joseph Bondy-  
Denomy**  
**University of California  
San Francisco**

*Bacterial Viruses  
Thwart CRISPR-Cas9*