

# CRISPR分子诊断技术服务简介

Next-generation diagnostics with CRISPR

2026年5月



# content

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- 01 技术原理与优势
- 02 研究进展与应用
- 03 服务内容与成果



# 技术原理与优势

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01



# 诺奖技术的应用拓展，生物技术创新的灯塔，正引领下一代分子诊断技术革新

## CRISPR 基因编辑技术 开创生命科学新纪元



## The 2020 Chemistry Laureates

The 2020 Nobel Prize in Chemistry is awarded to [Emmanuelle Charpentier](#) and [Jennifer A. Doudna](#) “for the development of a method for genome editing”.

Since Charpentier and Doudna discovered the CRISPR/Cas9 genetic scissors in 2012 their use has exploded. The genetic scissors have taken the life sciences into a new epoch and, in many ways, are bringing the greatest benefit to humankind.



## CRISPR 分子诊断技术 引领下一代分子诊断新时代



VIROLOGY

### *Next-generation diagnostics with CRISPR*

CRISPR-Cas biology promises rapid, accurate, and portable diagnostic tools

By [Daniel S. Chertow](#)

**R**apid and accurate identification of infectious diseases is essential to optimize clinical care and guide infection control and public health interventions to limit disease spread both in highly specialized medical centers and remote health care settings. The ideal diagnostic test would be inexpensive, accurate, and provide a result rapidly, allowing for point-of-care use on multiple specimen types without need for technical expertise, ancillary equipment, or power. Such a test

the CRISPR array, providing a recall element during recurrent infection. Pre-crRNA is transcribed as a long precursor and processed into mature form as crRNA to guide Cas proteins to cleave complementary sequences of foreign elements (interference) to degrade and eliminate those elements. By uncovering the structural and functional components of these diverse systems, new tools, including those applicable to molecular diagnostics, are emerging (see the figure).

Chen *et al.* report the discovery that when CRISPR-Cas12a proteins cleave double-stranded DNA (dsDNA) in a sequence-spe-

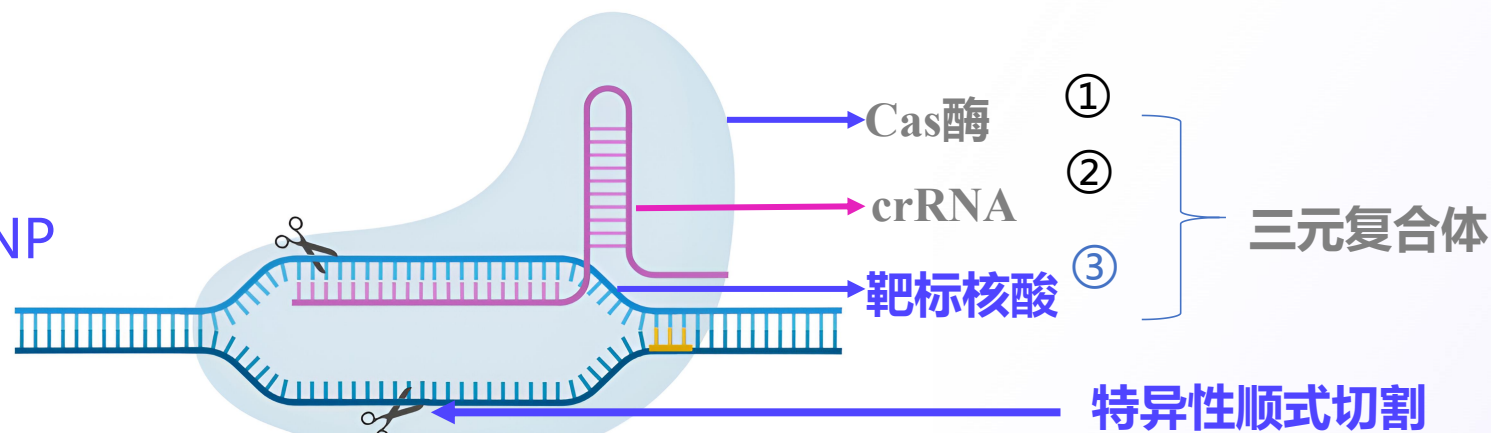


## 1 特异的靶标识别与切割

Cas12: DNA

Cas13: RNA

高特异：假阳性低，区分SNP

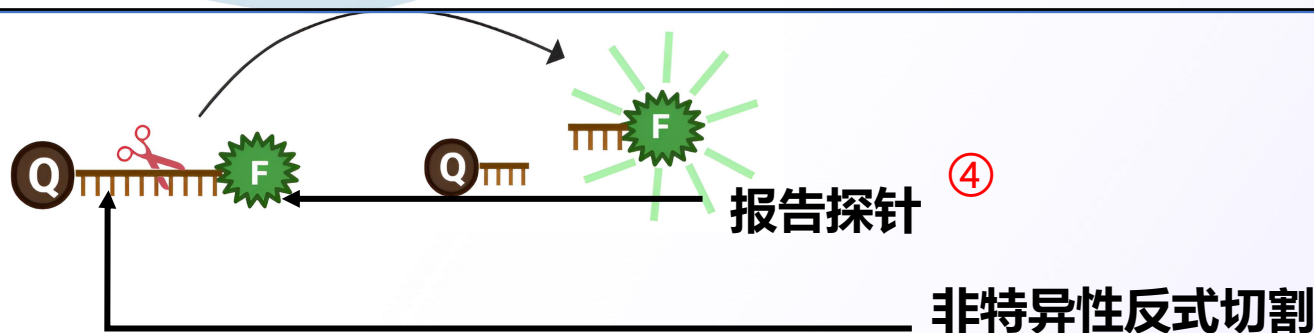


## 2 非特异的探针切割

Cas12: ssDNA reporter

Cas13: ssRNA reporter

高灵敏：高效切割，信号放大



# 技术特征：靶标的特异识别 + 高效的反式活性 + 恒温反应

技术优势： 高特异 + 高灵敏 + 快速便捷

**Table 3**

Comparison of the pros and cons of different pathogen nucleic acid detection methods.

Methods	PCR-based methods	Isothermal nucleic acid amplification	NGS	Gene chip	Electrical sensors	Optical sensors	CRISPR-Cas-based methods
Sensitivity	High	Medium	Medium-high	High	High	High	High
Specificity	High	High	Medium	High	Medium	Medium	High
Time	Long	Short	Long	Medium	Medium	Medium	Short
Quantitative testing?	Yes	feasible	No	Yes	No	feasible	highly feasible
Multiplexing	Yes	Yes	Highly feasible	highly feasible	No	No	highly feasible
Cost	Medium	Medium	High	High	Medium	High	Medium
Ease of use	Medium	Medium	Hard	Medium	Medium	Medium	Medium
POCT?	Hard	feasible	Hard	Hard	Hard	Hard	feasible

*Journal of Advanced Research, 2023*

抗原检测的便捷性 + PCR检测的准确性



# 研究进展与应用

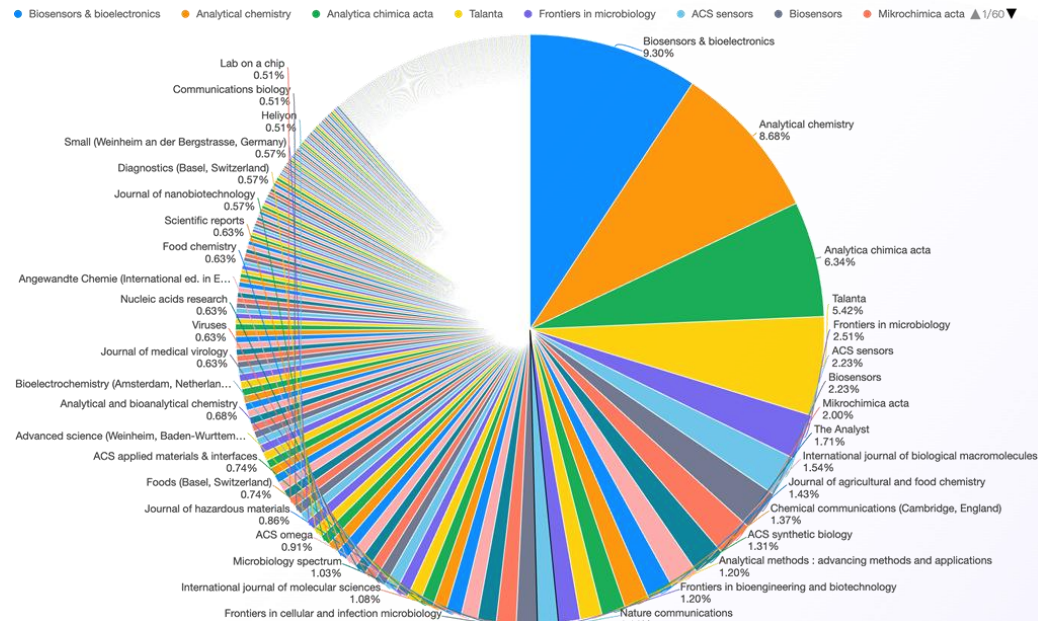
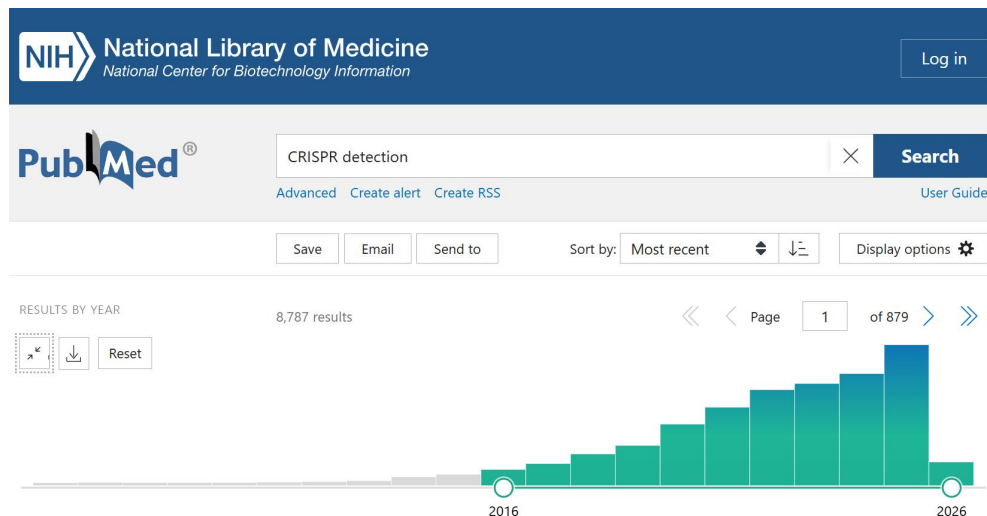
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02



# 科学研究热点，重点项目支持，创新成果涌现

Year	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Count	188	271	407	527	827	1063	1313	1398	1545	1947



Details

Science  
Volume 356, Issue 6336  
Apr 2017

ARTICLE  
Nucleic acid detection with CRISPR-Cas13a/C2c2

View article page

Jonathan S. Gootenberg, Omar O. Abudayyeh, Jeong Wook Lee, Patrick Essletzbichler, Aaron J. Dy, Julia Joung, Vanessa Verdine, Nina Donghia, Nichole M. Daringer, Catherine A. Freije, Cameron Myhrvold, Roby P. Bhattacharyya, Jonathan Livny, Aviv Regev, Eugene V. Koonin, Deborah T. Hung, Pardis C. Sabeti, James J. Collins and Feng Zhang

Cell Article

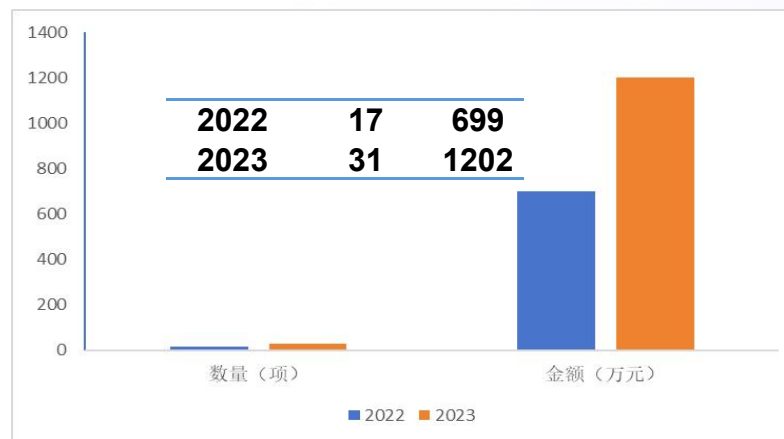
**Amplification-free detection of SARS-CoV-2 with CRISPR-Cas13a and mobile phone microscopy**

Graphical Abstract

Authors: Parinaz Fozouni, Sungmin Son, Maria Diaz de León Derby, Jennifer A. Doudna, Daniel A. Fletcher, Melanie Ott

Highlights:

- CRISPR-Cas13a can quantitatively detect SARS-CoV-2 RNA without pre-amplification
- Combining crRNAs targeting multiple regions of the viral RNA enhances sensitivity
- Cas13a can accurately and rapidly quantify SARS-CoV-2 RNA in patient samples
- A mobile phone-based device allows for portable and sensitive readout of the assay

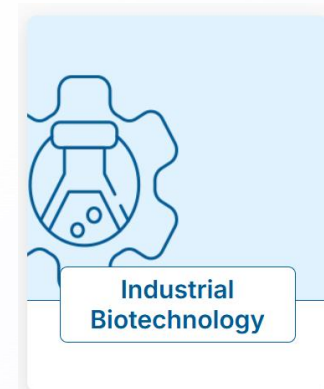
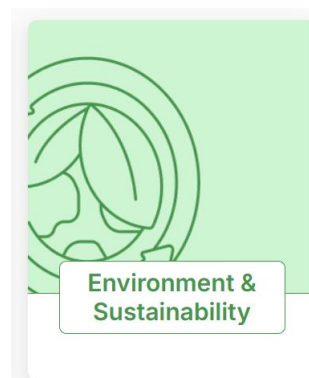
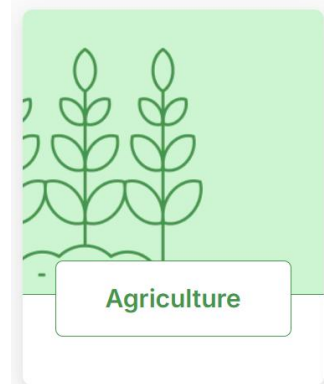


## “前沿生物技术”重点专项 2025 年度第二批项目申报指南

### 1. 便捷高敏 CRISPR 检测系统的研发与应用（技术开发类）

研究内容：通过结构生物学、RNA 结构改造、核化学及蛋白质设计等技术手段，挖掘耐高温、分子量低、靶标分辨率高、反式切割功能丰富、表达量高、高保真、低毒性的 Cas 核酸酶；将 CRISPR 和核酸等温扩增技术融合，开发普适性的基于 CRISPR 体系的一步法核酸检测系统；基于蛋白质设计构建非核酸靶标响应的 CRISPR/Cas 酶蛋白分子开关，并开发新型检测系统，实现对病原体的高灵敏检测；构建用于 CRISPR/Cas 检测系统的信号收集和传递的物联网元件，结合 AI 智能分析技术，设计和制备通用型病原体预处理和多重检测一体化芯片，检测目标病毒、真菌、细菌，实现高通量、高灵敏、便携式的现场检测，并在疾控、海关、医院等不同场景中进行验证。

# 应用领域：医疗健康是绝对的主角，农业食品安与环境等应用领域方兴未艾



# 医疗健康领域 (3大底层技术)

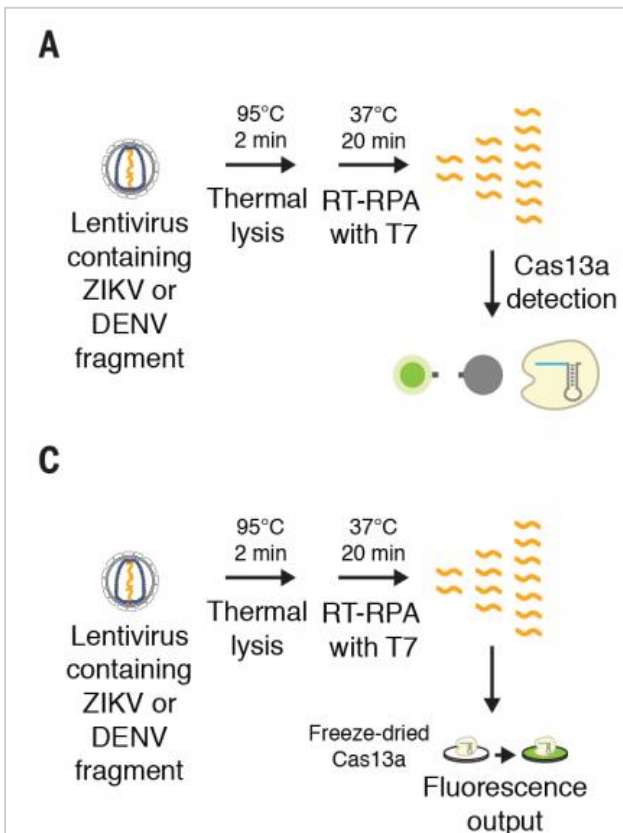
## SHERLOCK

Science REPORTS

Cite as: J. S. Gootenberg *et al.*, *Science* 10.1126/science.aam9321 (2017).

### Nucleic acid detection with CRISPR-Cas13a/C2c2

Jonathan S. Gootenberg,<sup>1,2,3,4,5,6</sup> Omar O. Abudayyeh,<sup>1,2,3,4,6,8</sup> Jeong Wook Lee,<sup>7</sup> Patrick Essletzbichler,<sup>1,2,3,4</sup> Aaron J. Dy,<sup>1,4,5</sup> Julia Jung,<sup>1,2,3,4</sup> Vanessa Verdine,<sup>1,2,3,4</sup> Nina Donghia,<sup>7</sup> Nichole M. Daringer,<sup>8</sup> Catherine A. Freije,<sup>1,11</sup> Cameron Myhrvold,<sup>1,11</sup> Roby P. Bhattacharyya,<sup>1</sup> Jonathan Livny,<sup>1</sup> Aviv Regev,<sup>1,9</sup> Eugene V. Koonin,<sup>10</sup> Deborah T. Hung,<sup>1</sup> Pardis C. Sabetti,<sup>11,12,13</sup> James J. Collins,<sup>1,4,5,7,8,9</sup> Feng Zhang<sup>1,2,3,4</sup>

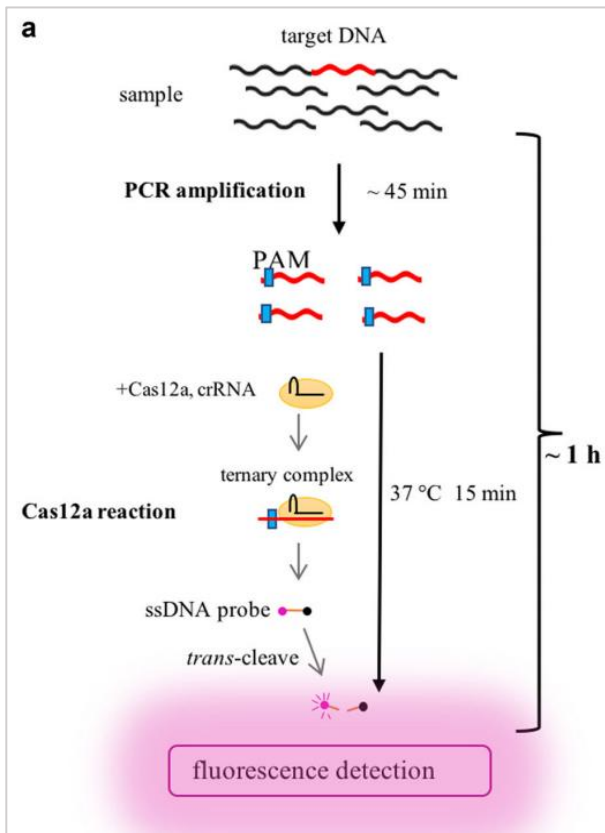


## HOLMES

Li *et al.* *Cell Discovery* (2018)4:20  
DOI: 10.1038/s41421-018-0028-z Cell Discovery

CORRESPONDENCE Open Access

### CRISPR-Cas12a-assisted nucleic acid detection

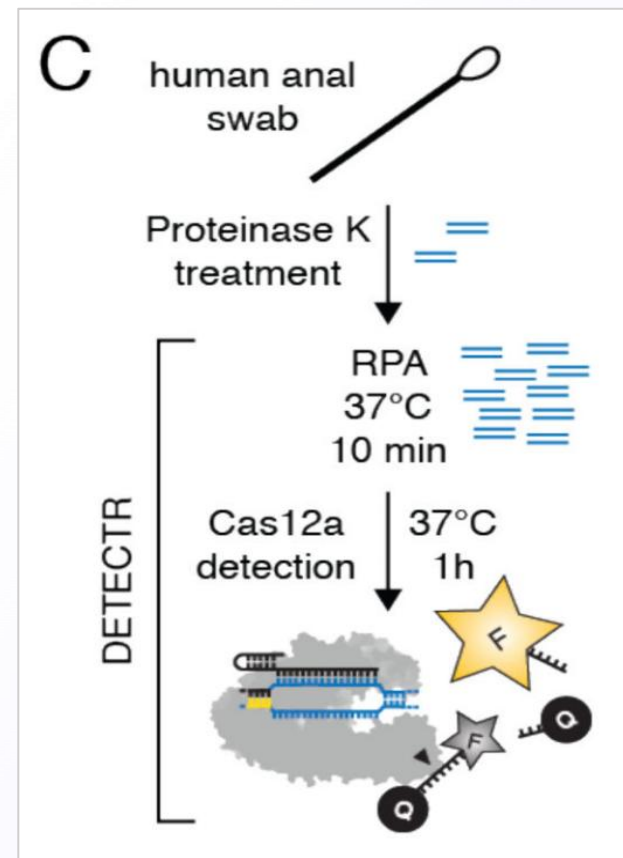


## DETECTR

Published as: *Science*, 2018 April 27; 360(6387): 436–439.

### CRISPR-Cas12a target binding unleashes indiscriminate single-stranded DNase activity

Janice S. Chen<sup>1,†</sup>, Enbo Ma<sup>1,†</sup>, Lucas B. Harrington<sup>1,†</sup>, Maria Da Costa<sup>2</sup>, Xinran Tian<sup>3</sup>, Joel M. Palefsky<sup>2</sup>, and Jennifer A. Doudna<sup>1,3,4,5,6,\*</sup>





# 医疗健康领域 (贴近临床需求)

双基因

冻干

试纸条

简易提取

性能验证

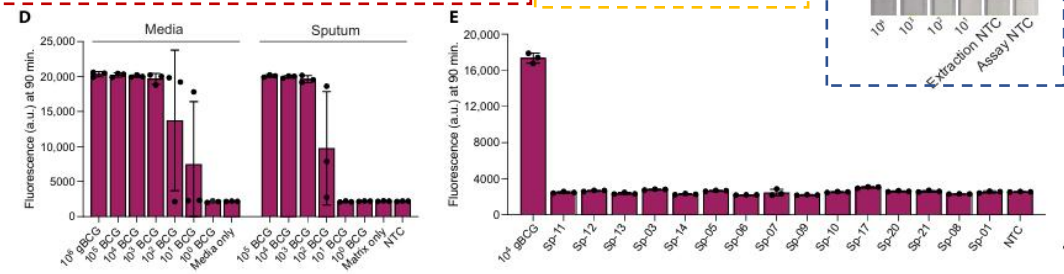
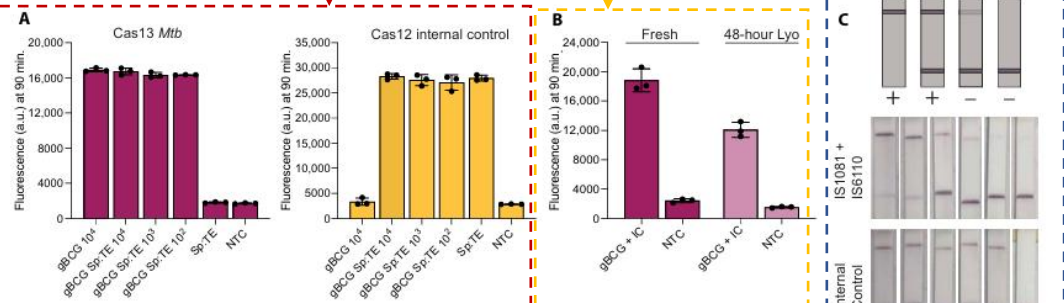
SCIENCE ADVANCES | RESEARCH ARTICLE

RESEARCH METHODS

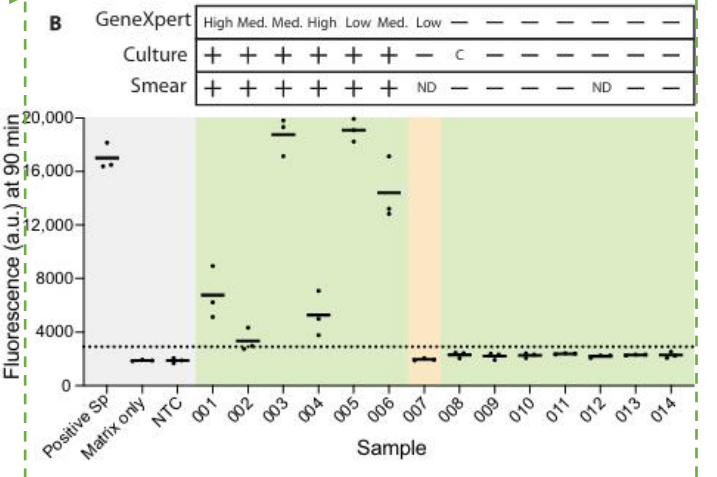
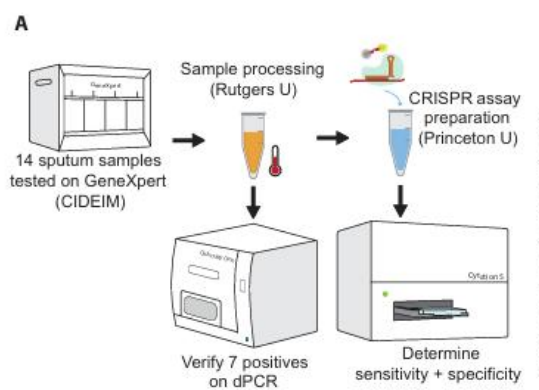
## A streamlined CRISPR-based test for tuberculosis detection directly from sputum

Alexandra G. Bell<sup>1</sup>†, Owen R. S. Dunkley<sup>1</sup>††, Nisha H. Modi<sup>2</sup>, Yujia Huang<sup>1</sup>, Soleil Tseng<sup>1</sup>, Robert Reiss<sup>2</sup>, Naranjargal Daivaa<sup>3</sup>, J. Lucian Davis<sup>3,4</sup>, Deninson Alejandro Vargas<sup>5,6</sup>, Padmapriya Banada<sup>5</sup>, Yingda L. Xie<sup>5</sup>, Cameron Myhrvold<sup>1,7,8,9,\*</sup>

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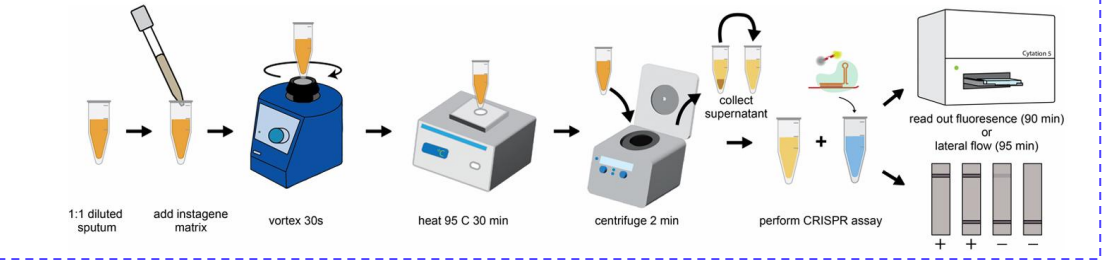
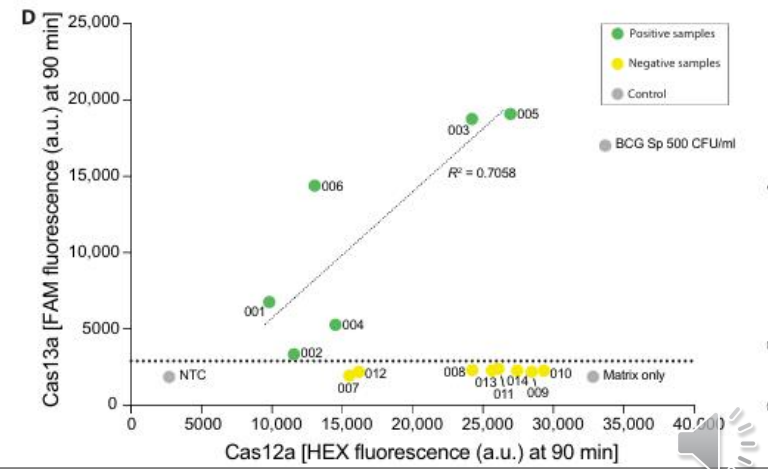


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**C** Confusion matrices for CRISPR and GeneXpert.

	+	-		+	-
Culture	6	0	GeneXpert	6	1
-	0	7	-	0	7
	+ CRISPR			+ CRISPR	
dPCR	6	0	GeneXpert	6	1
-	NA	NA	-	0	6
	+ CRISPR			+ Culture	



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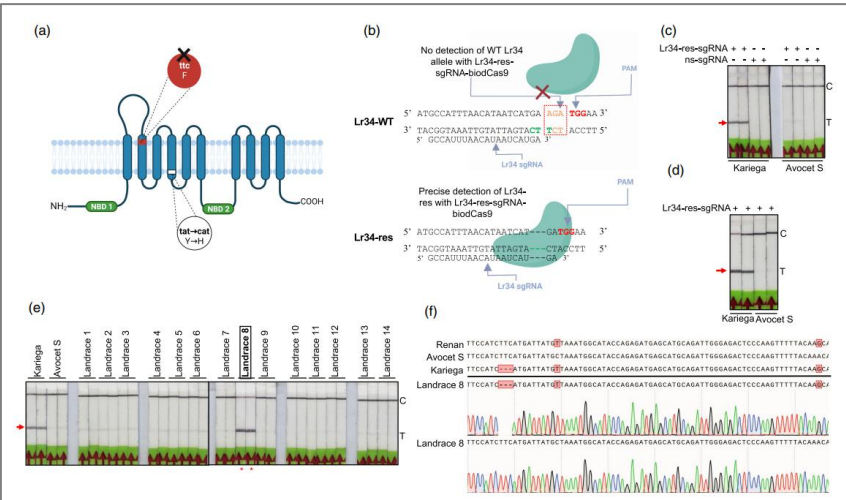
# 农业领域 (基因分型, 植物病原菌, 转基因成分, 动物疫病)

## 小麦抗病基因分型选择

Plant Biotechnology Journal  

Plant Biotechnology Journal (2022) 20, pp. 2418–2429 doi: 10.1111/pbi.13924

### A CRISPR-based lateral flow assay for plant genotyping and pathogen diagnostics



## 转基因现场检测

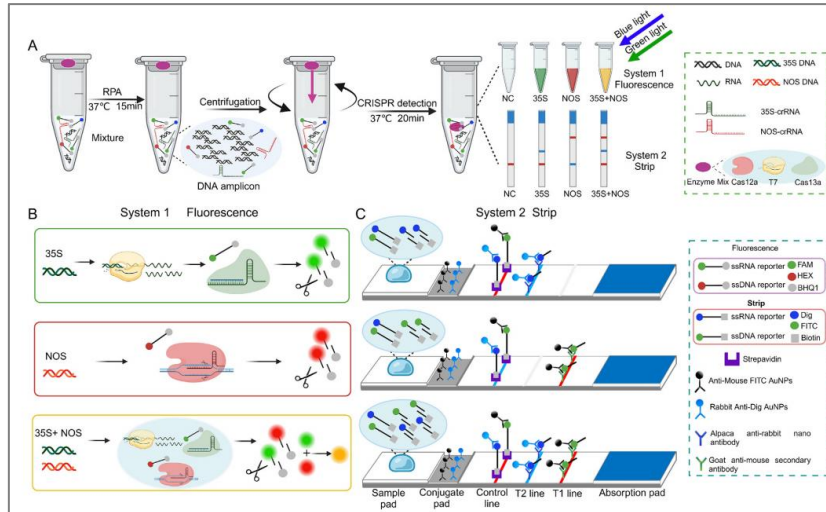
Contents lists available at ScienceDirect 

Journal of Advanced Research


journal homepage: www.elsevier.com/locate/jare

Original Manuscript

### Development of a novel Cas13a/Cas12a-mediated 'one-pot' dual detection assay for genetically modified crops

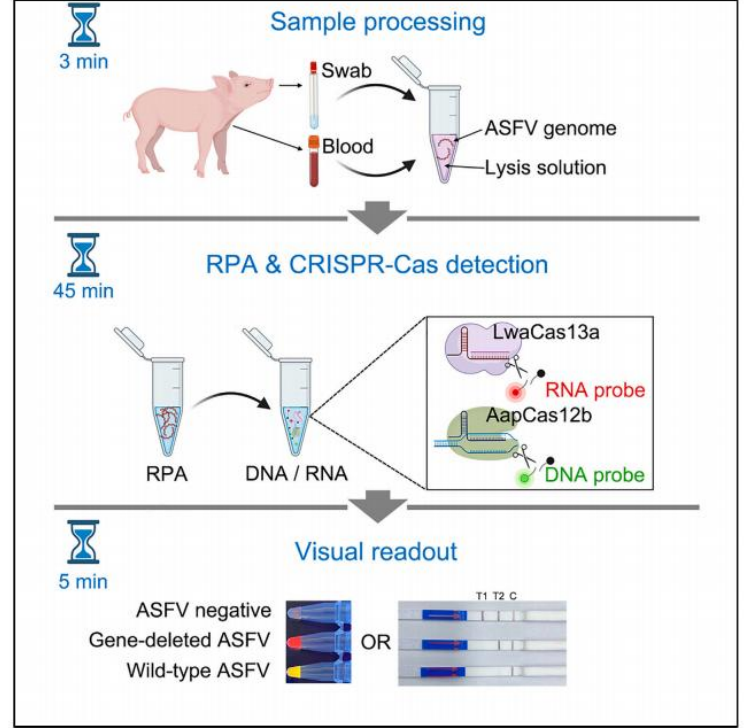


## 非洲猪瘟现场检测

iScience  OPEN ACCESS

Article

### On-site detection and differentiation of African swine fever virus variants using an orthogonal CRISPR-Cas12b/Cas13a-based assay



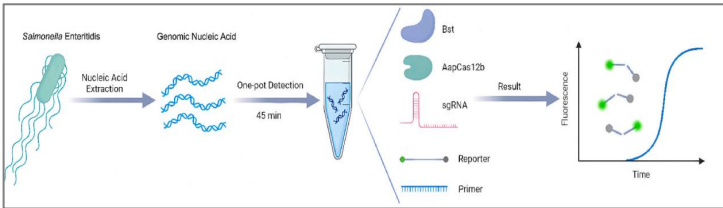
## 食源性病原微生物

Contents lists available at ScienceDirect

**Food Control**

journal homepage: [www.elsevier.com/locate/foodcont](http://www.elsevier.com/locate/foodcont)

Rapid and accurate detection of *Salmonella enterica* serovar Enteritidis using a one-step LAMP-CRISPR/Cas12b method



Analyst

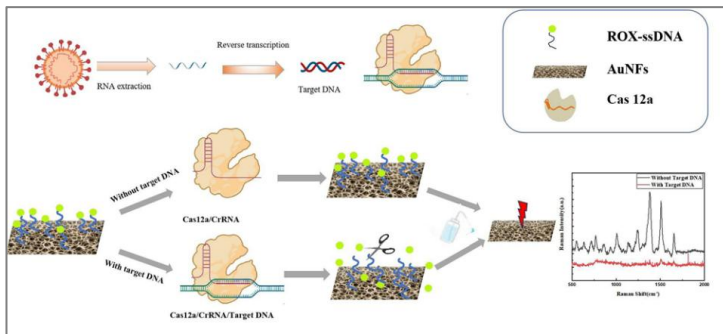
ROYAL SOCIETY OF CHEMISTRY

PAPER

Check for updates

Cite this: *Analyst*, 2024, 149, 4343

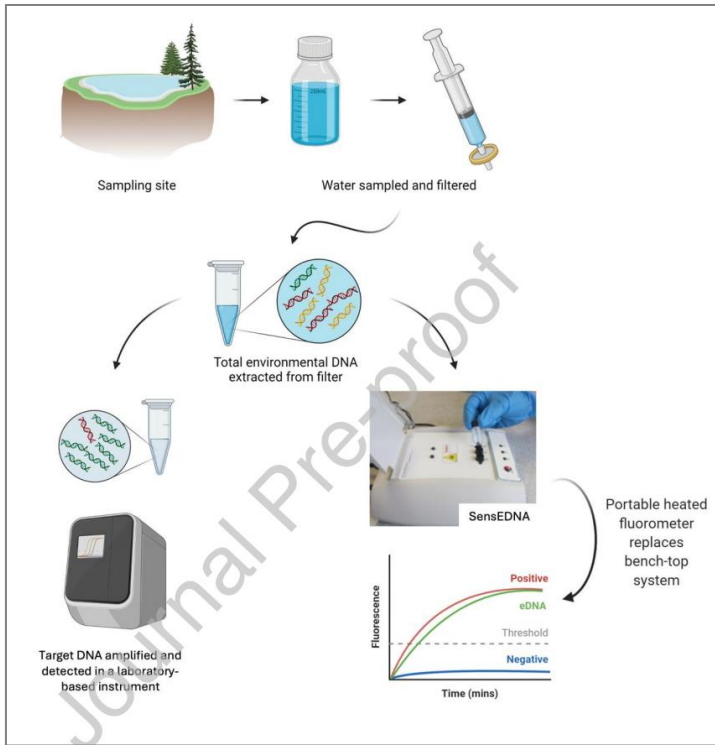
**A CRISPR/Cas12a-powered gold/nickel foam surface-enhanced Raman spectroscopy biosensor for nucleic acid specific detection in foods†**



## 环境DNA

Journal Pre-proof

**SensEDNA: An innovative optical CRISPR platform for rapid environmental DNA monitoring**



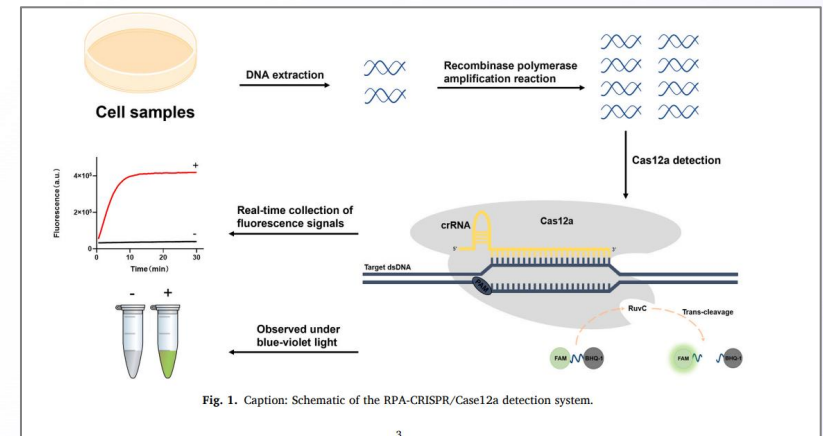
## 抗体生产支原体污染

Contents lists available at ScienceDirect

**Journal of Pharmaceutical and Biomedical Analysis**

journal homepage: [www.journals.elsevier.com/journal-of-pharmaceutical-and-biomedical-analysis](http://www.journals.elsevier.com/journal-of-pharmaceutical-and-biomedical-analysis)

Rapid and sensitive Mycoplasma detection in antibody bioprocessing via RPA-CRISPR/Cas12a



# 聚焦应用转化的关键共性技术，创新公司布局产品研发

## 2025-2026研究论文与综述

nature biomedical engineering

IF 26.6

Article

<https://doi.org/10.1038/s41551-025-01424-6>

**LbuCas13a directly targets DNA and elicits strong *trans*-cleavage activity**

Article

**RNA-triggered Cas12a3 cleaves tRNA tails to execute bacterial immunity**

IF 48.5

CellPress

IF 14.3

Trends in  
Biotechnology

Review

Trends in developing one-pot CRISPR diagnostics strategies



IF 12

Trends in Analytical Chemistry

journal homepage: [www.elsevier.com/locate/trac](http://www.elsevier.com/locate/trac)



AI-enhanced CRISPR diagnostics: From gRNA design to Cas protein engineering and signal analytics

## CRISPR-Dx创新公司



# 服务内容与成果

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03



# 从方案设计到项目实施再到成果交付的整体解决方案（一锅法、灵敏、特异）

## 1.方案设计

- 结合客户专业领域和最新进展制定个性化服务方案

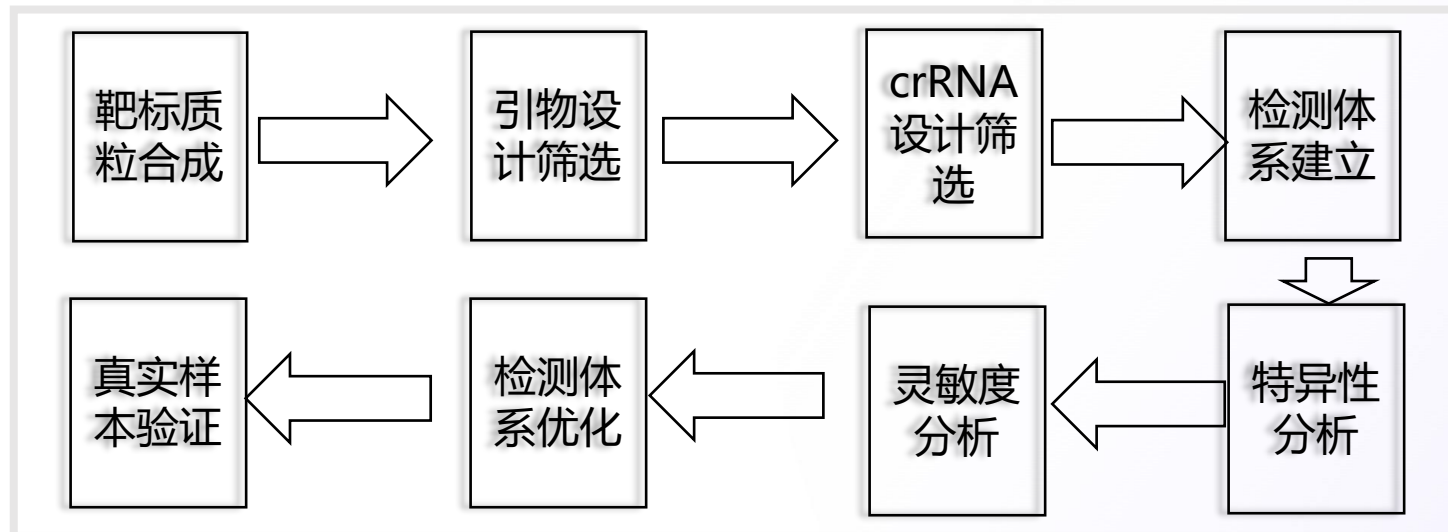
## 2.项目实施

- 从靶标筛选、体系搭建到性能验证的全流程实施







## 3.成果交付

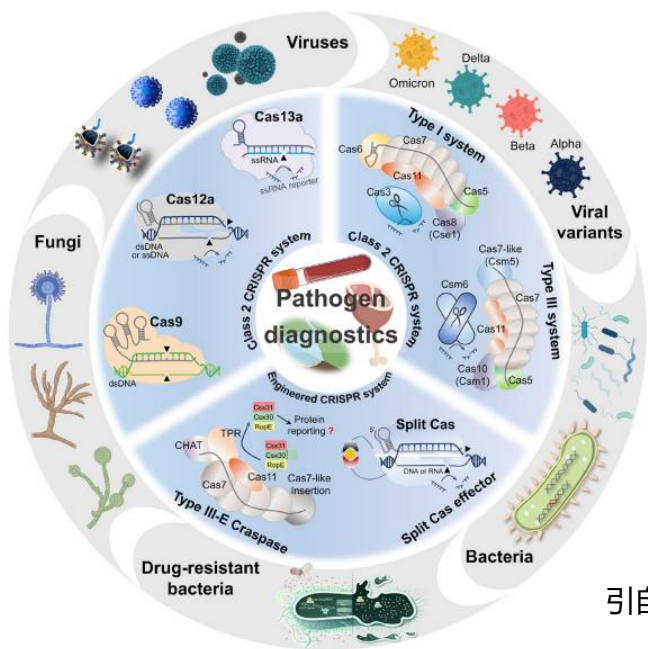
- 里程碑阶段交付与成果“交钥匙工程”让客户更省心

### 项目实施具体实验步骤



# 覆盖6大种类，助力客户发表科研论文10余篇，累计影响因子 > 60

-  **病毒 (14)**
-  **细菌 (22)**
-  **真菌 (5)**
-  **支原体 (3)**
-  **寄生虫 (1)**
-  **标志物 (2)**



引自: Trends in Analytical Chemistry, 2023

Food Control 164 (2024) 110534

**IF6.3 中科院1区**

Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

**Food Control**

journal homepage: [www.elsevier.com/locate/foodcont](http://www.elsevier.com/locate/foodcont)






**Journal of  
Clinical Microbiology**

AMERICAN SOCIETY FOR MICROBIOLOGY

**IF5.4 中科院2区**

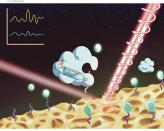



Clinical Microbiology | Full-Length Text

**Analyst**


**IF3.3 封面文章**

PAPER





中华传染病杂志 2025 年 11 月第 43 卷第 11 期 Chin J Infect Dis, November 2025, Vol. 43, No. 11



中华传染病杂志

— 673 —

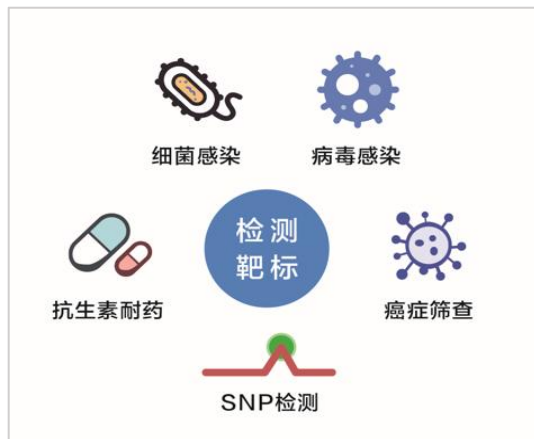
· 论著 ·



# 从实验室到临床，从创新成果到应用转化

## 服务对象

- **医疗健康领域：**  
感染、肿瘤、检验  
遗传病、疾控等
- **农业食品环境**



## 客户提供

- **真实样本**
- **临床数据**
- **伦理**
- **标准品与干扰核酸**



## 我们提供

- **技术报告**
- **试剂产品**
- **技术培训**
- **转化应用**



**CRISPR: Tool for Developing New Diagnostic Assays**

**THANKS**

