

# Recombinant DNA: DNA Cut-and-Paste

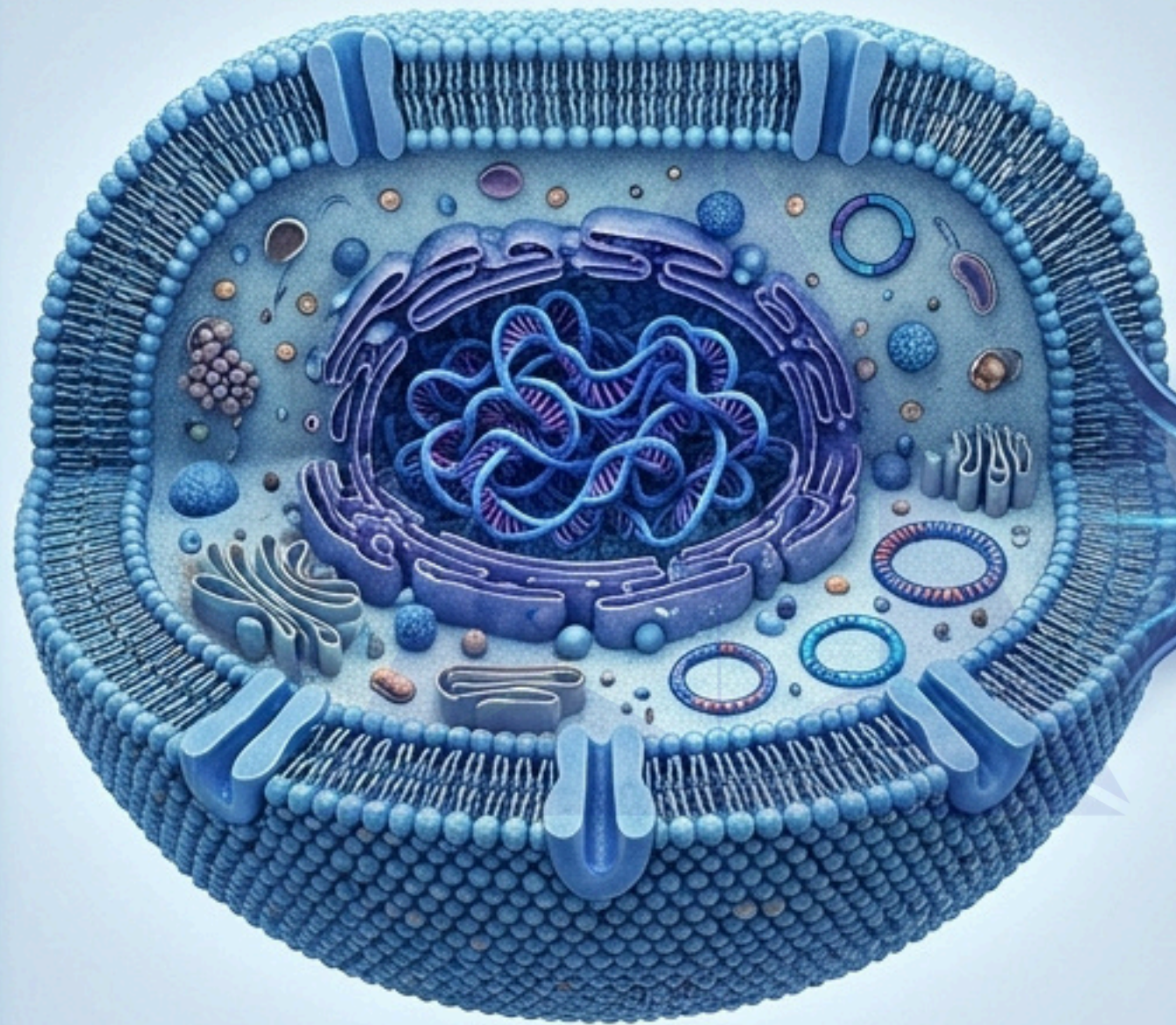
The molecular assembly line that defined modern biotechnology.

## The 1972 Breakthrough

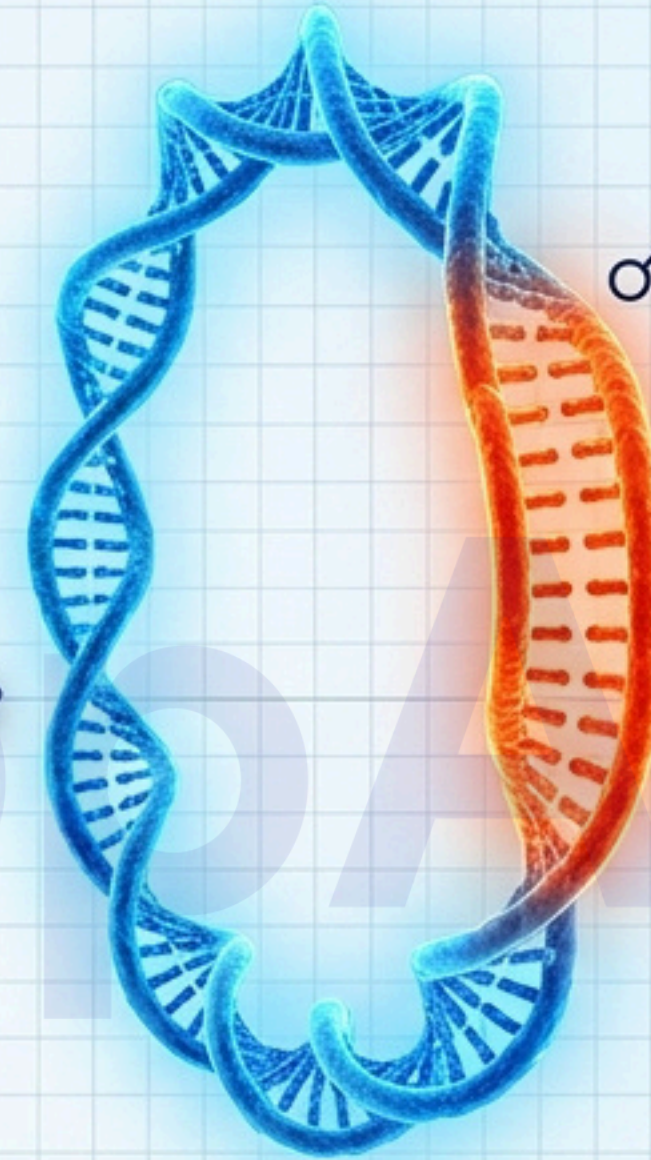
Stanley Cohen and Herbert Boyer founded the discipline of biotechnology by proving that genetic material could be extracted, precisely combined in vitro, and inserted into a new host to act as a manufacturing plant.



Source: *Salmonella typhimurium*



ISOLATION



Extracted zringlet  
3D ringlet of  
native plasmid DNA

### Target Gene

The specific sequence  
responsible for  
conferring antibiotic  
resistance.

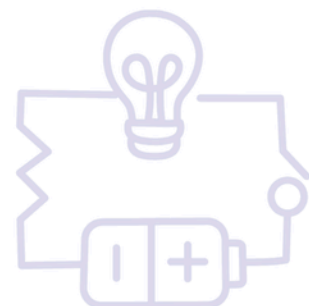
### The Objective

Isolate this exact piece of alien DNA (a desirable trait) to transfer it to a new organism without bringing along any undesirable genes.



**You've Learned the Theory.  
Let's Test Them Now.**

$$E=mc^2$$



Turn theory into marks with **unlimited MCQs, smart analysis, and focused revision.**

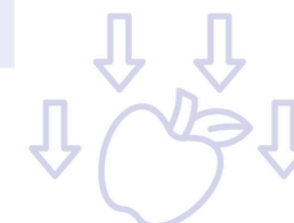
**Practice Now**



At [prep.topall.app](https://prep.topall.app)

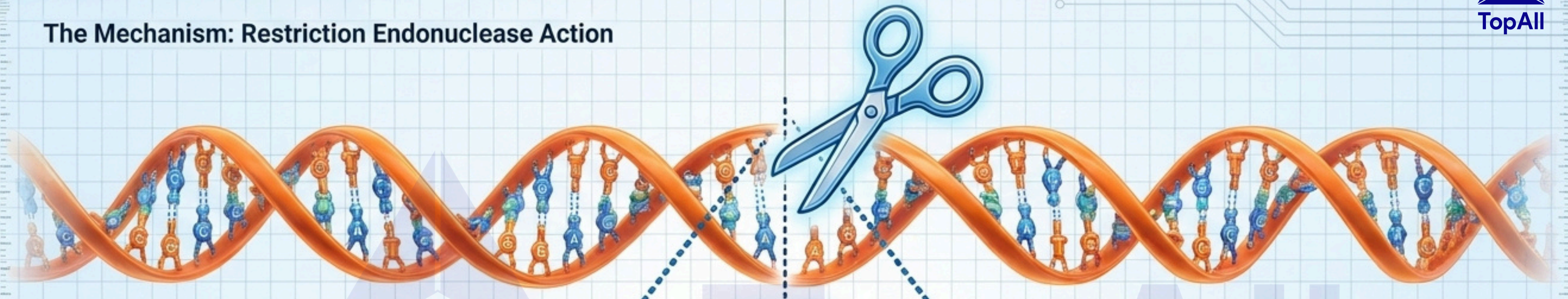
### Key Highlights

- » Free Study Material, Videos & Infographics
- » Push Your Limits with Level-Based Challenges
- » Climb the Leaderboard Among Fellow Aspirants
- » Practice Unlimited MCQs for NEET & JEE
- » Get Clear Explanations, Not Just Marks
- » Track Your Performance Smarter

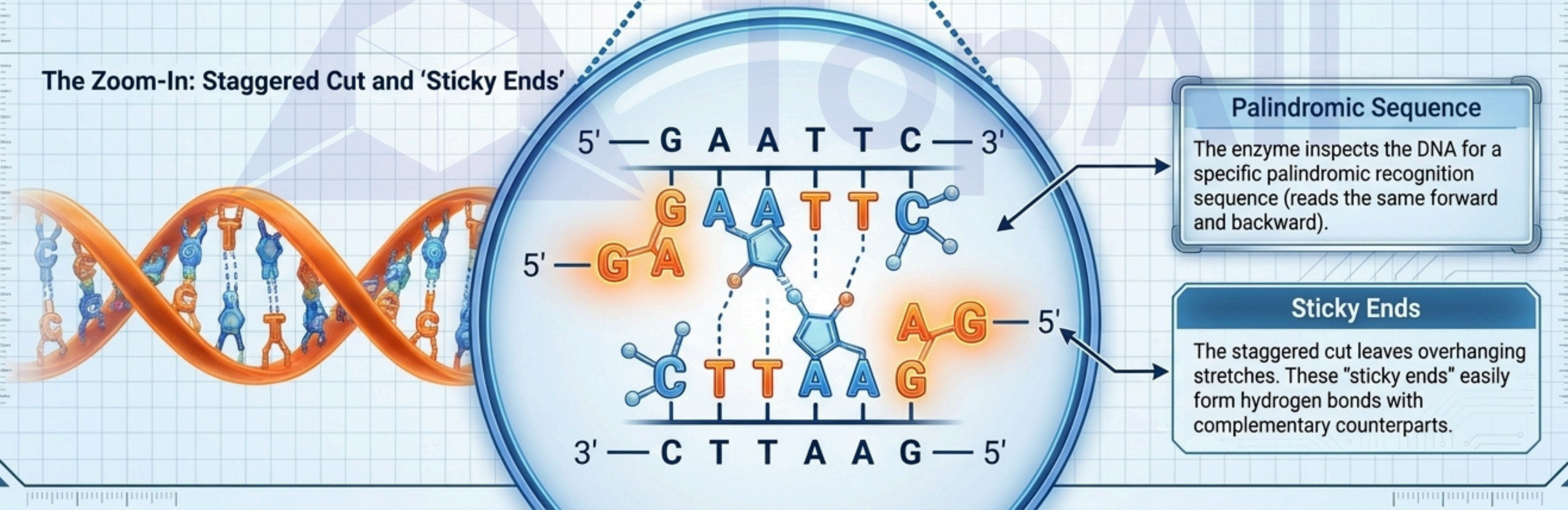


# Precision Medical Blueprint: Molecular Mechanics of DNA Cutting

## The Mechanism: Restriction Endonuclease Action



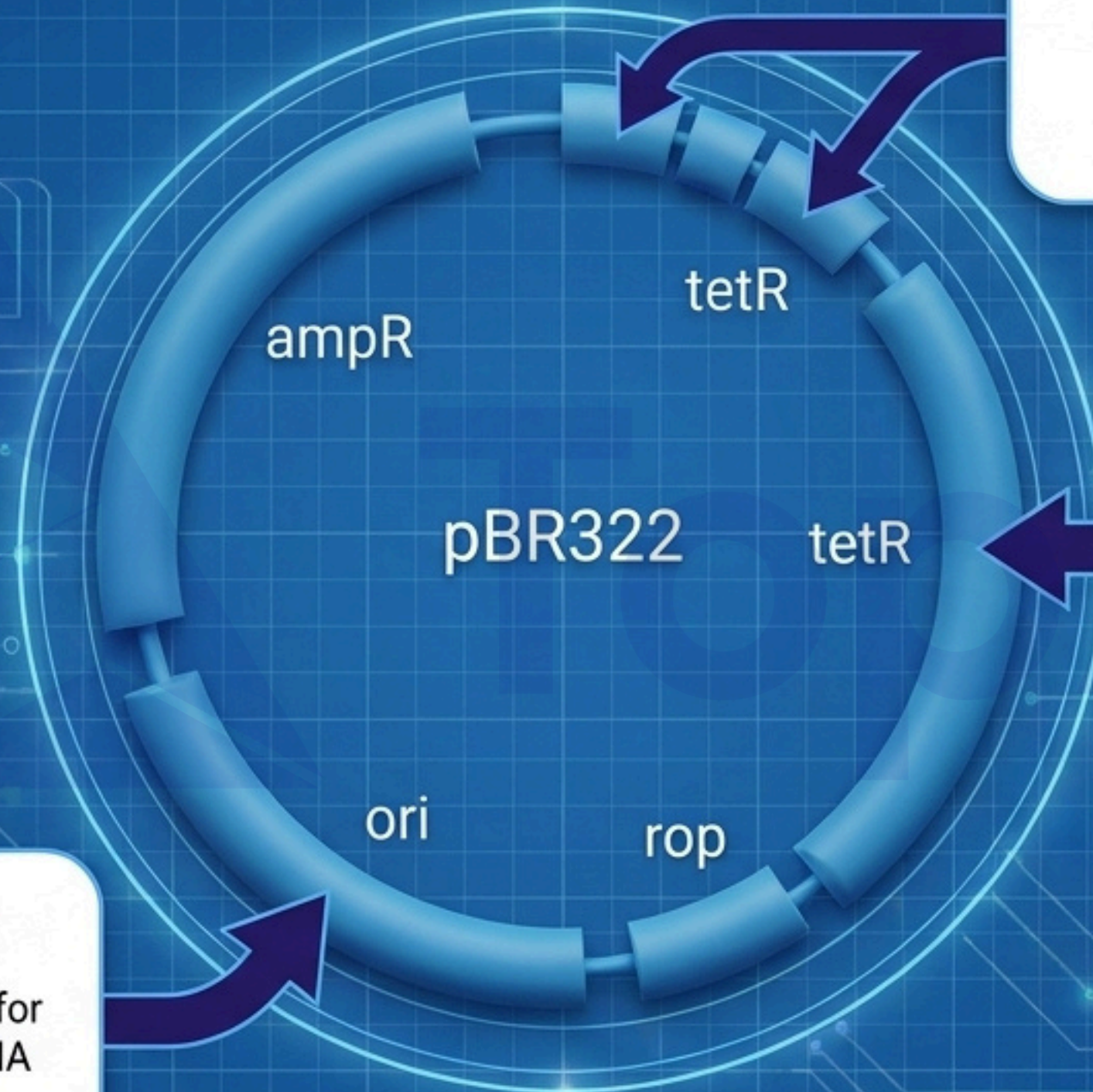
## The Zoom-In: Staggered Cut and 'Sticky Ends'



# The Plasmid as a Vector



Functioning as a “molecular taxi,” a plasmid delivers alien DNA into a host organism—similar to how a mosquito acts as an insect vector.



## Cloning Sites

Single recognition sites where restriction enzymes open the vector to insert the new gene.

## Selectable Marker

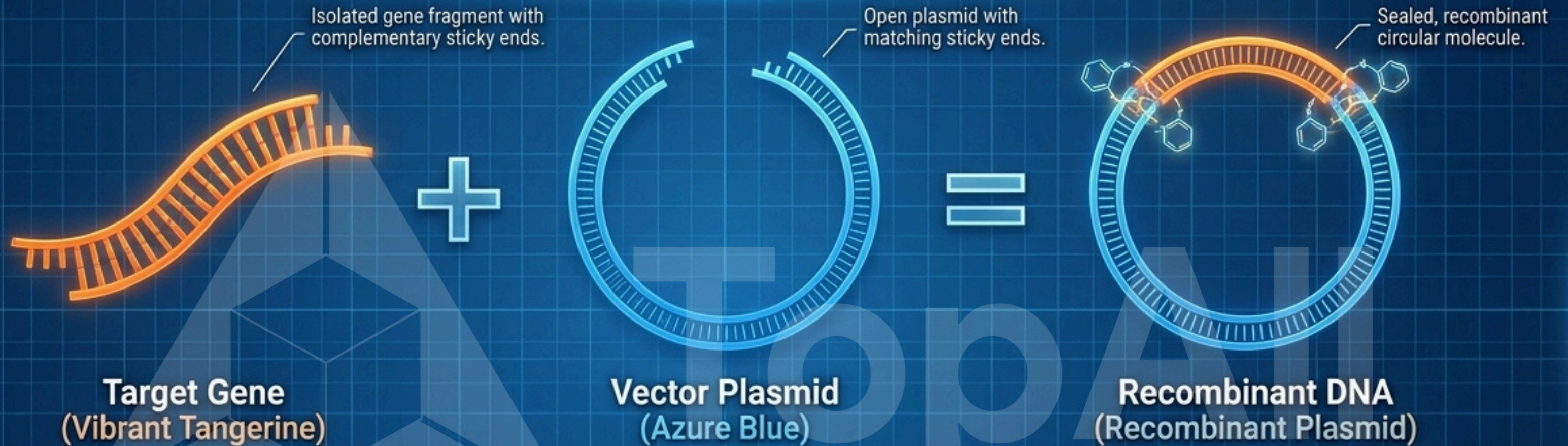
Genes (like antibiotic resistance) that help scientists identify and select only the successful transformant cells.

## Origin of Replication (ori)

A specific sequence responsible for initiating replication. The alien DNA must link here to multiply.



# Precision Medical Blueprint: Molecular Mechanics of DNA Pasting (Ligation)



## The Match

Sticky ends form hydrogen bonds with their complementary cut counterparts.



## The Seal

DNA Ligase acts on the cut molecules, permanently sealing the sugar-phosphate backbones together.

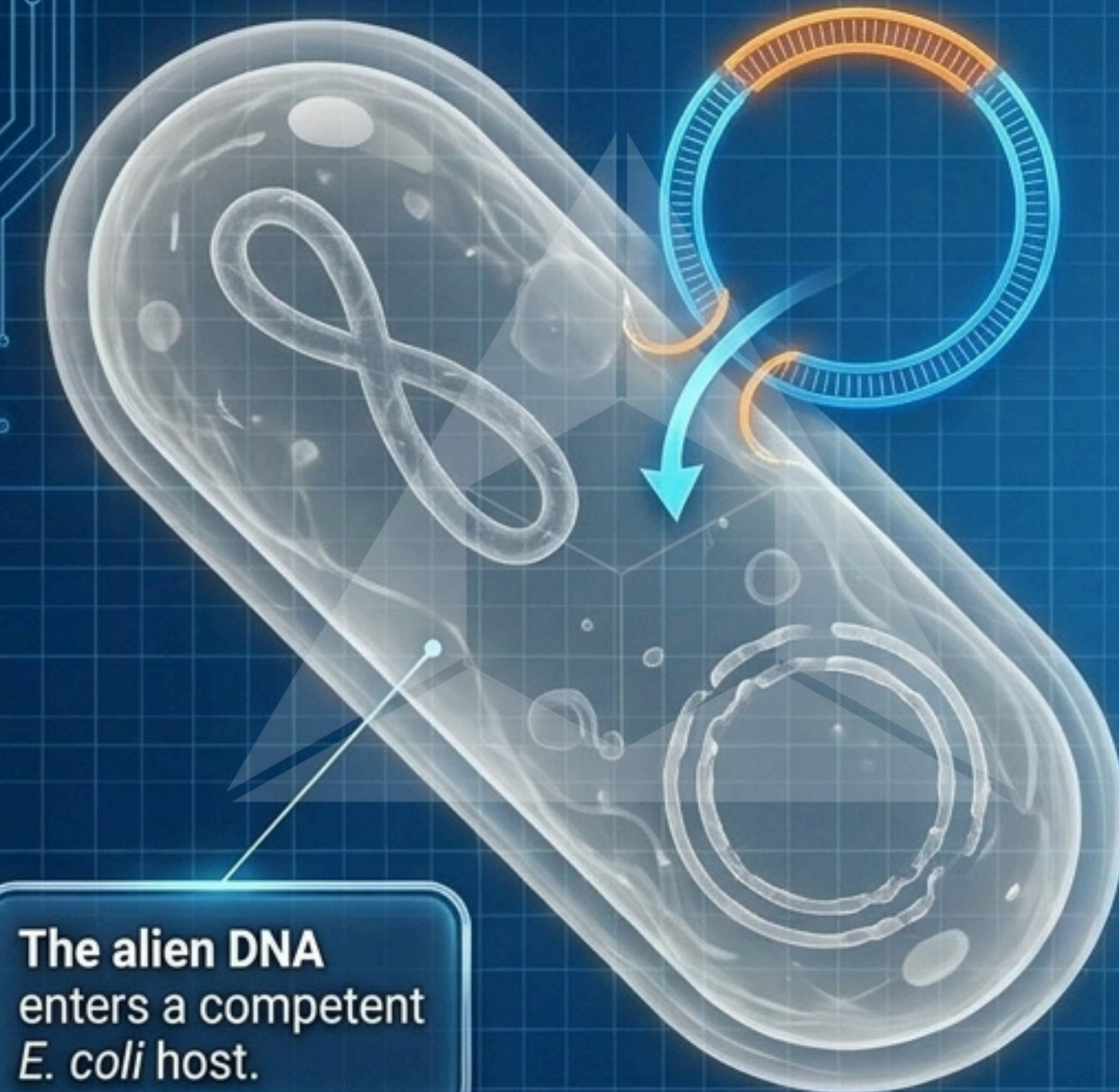


## The Result

A new, closed, circular, autonomously replicating molecule created in vitro—Recombinant DNA.

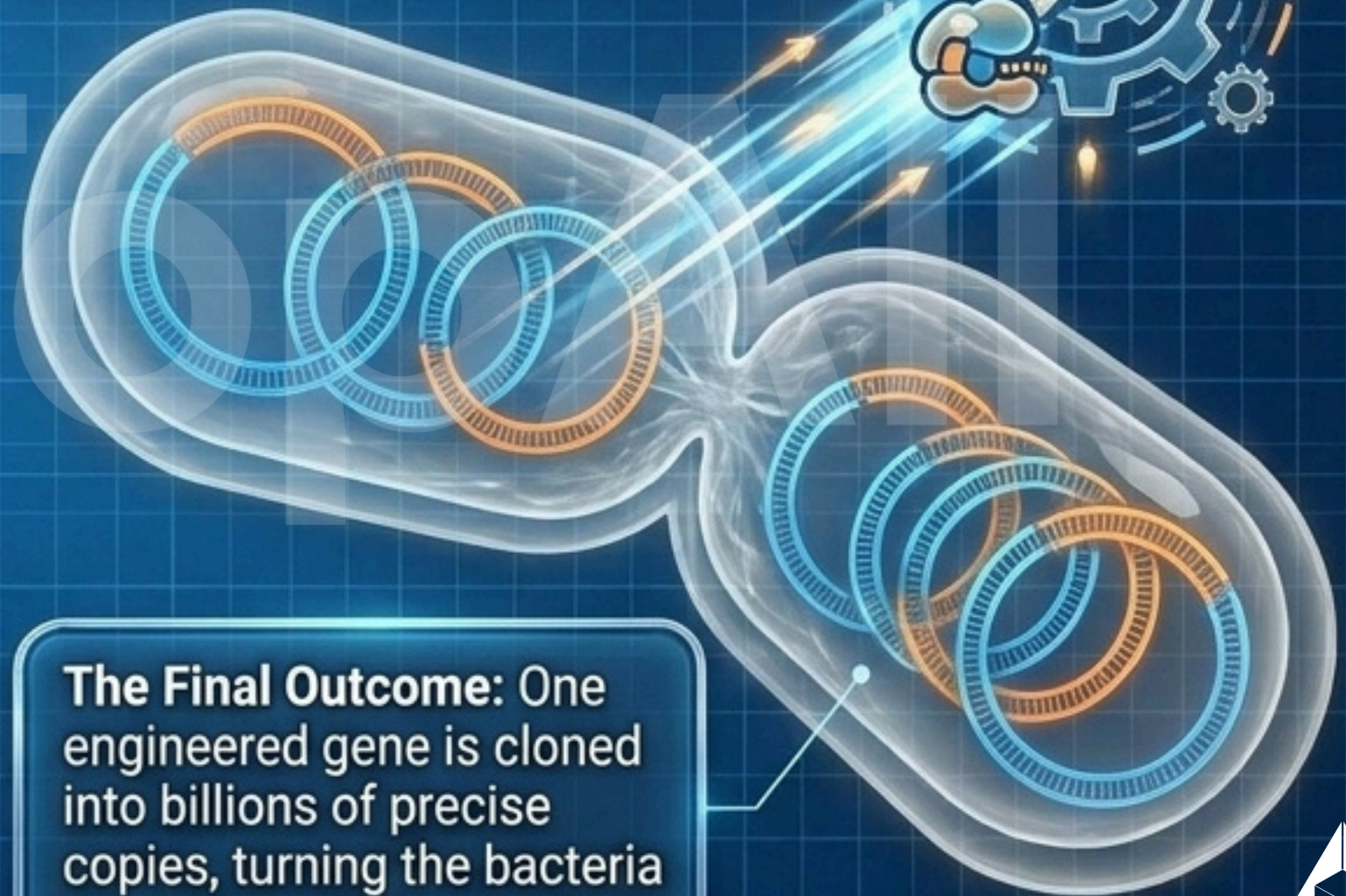


## Stage 1: Transformation



## Stage 2: Cloning & Multiplication

**Hijacking the Machinery:** Linked to the vector's ori, the alien gene forces the host's DNA polymerase to replicate it alongside the host DNA.





# You've Learned the Theory.

## Now Let's Test It.

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