

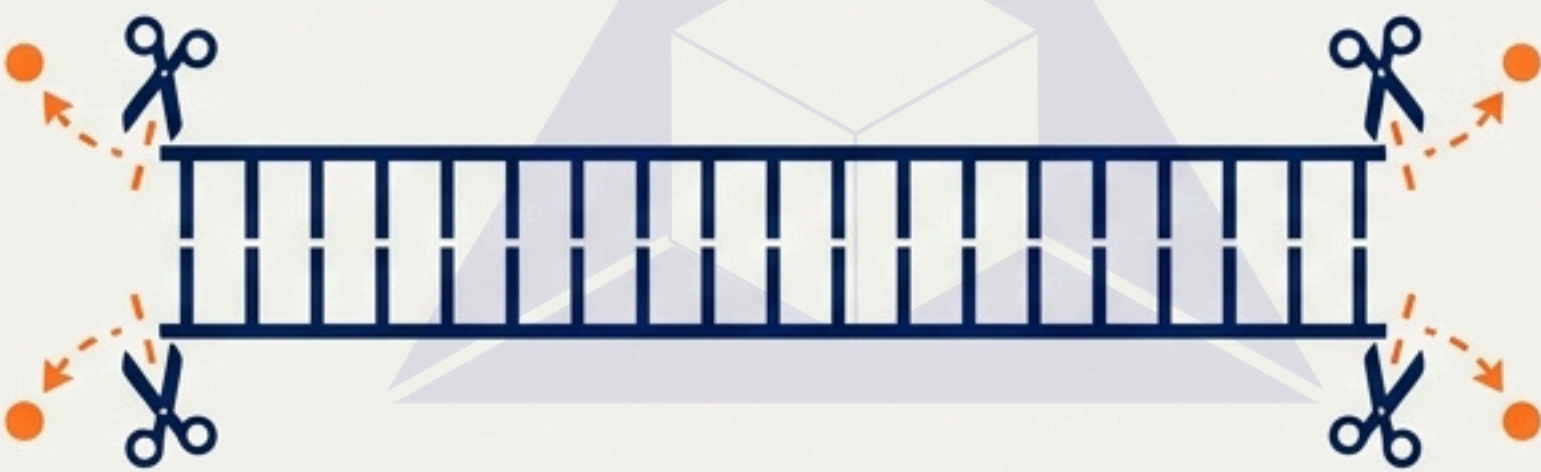
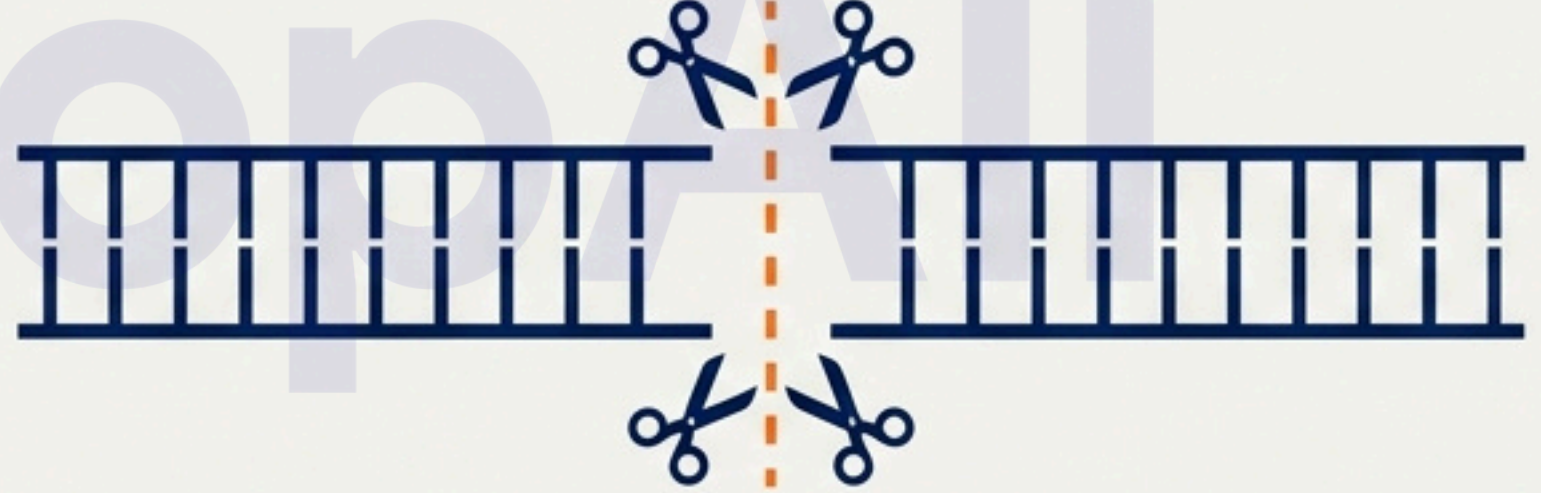
# Restriction Enzymes: Molecular Scissors

The foundational tools of Recombinant DNA technology that allow scientists to precisely cut and manipulate genetic code.



# Nucleases: Two Distinct Mechanisms

Restriction enzymes belong to a larger class of enzymes called nucleases. They operate in two fundamentally different ways:

| Exonucleases                                                                                                                                            | Endonucleases                                                                                                                                                |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <p>Remove nucleotides from the absolute ends of the DNA strand.</p> |  <p>Make precise cuts at specific positions within the DNA molecule.</p> |

# Profile: Hind II

**Status:**

The first restriction endonuclease discovered.

**Mechanism:**

Functions by inspecting the DNA nucleotide sequence.

**Target:**

Always cuts DNA molecules at a particular point by recognizing a specific sequence of exactly six base pairs.

**Designation:**

This specific 6-base target is known as its “recognition sequence”.

Scale of the Arsenal: Since Hind II's isolation, over 900 restriction enzymes have been isolated from over 230 strains of bacteria, each recognizing different sequences.



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

$$E=mc^2$$



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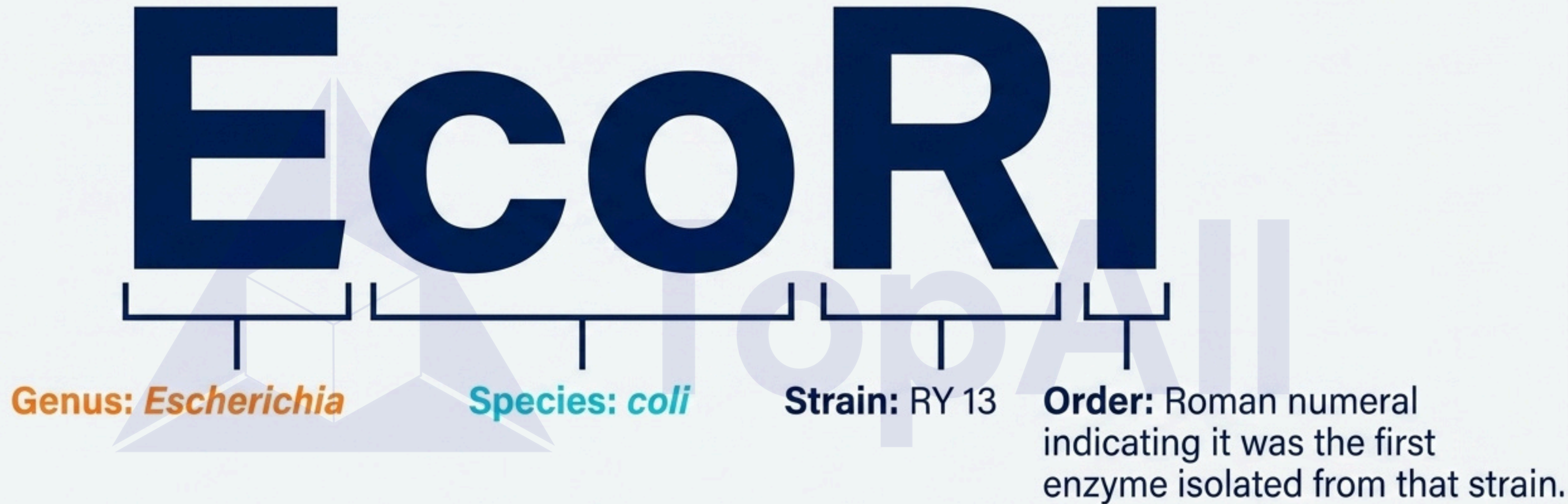
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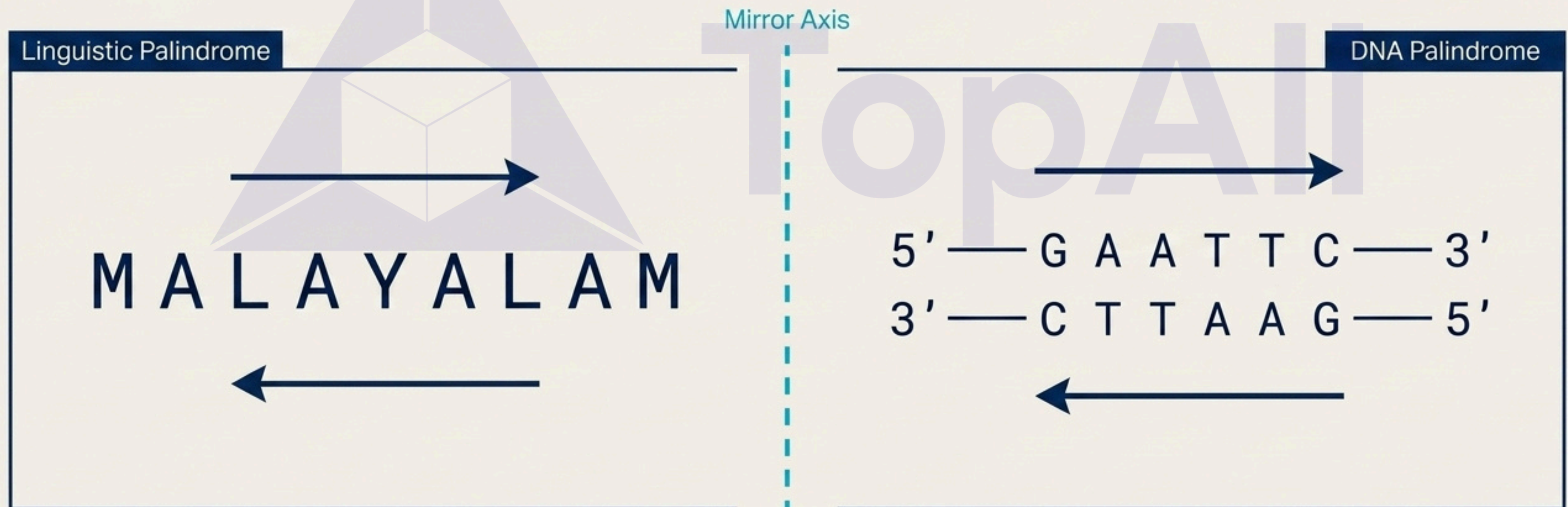
# The Anatomy of a Name



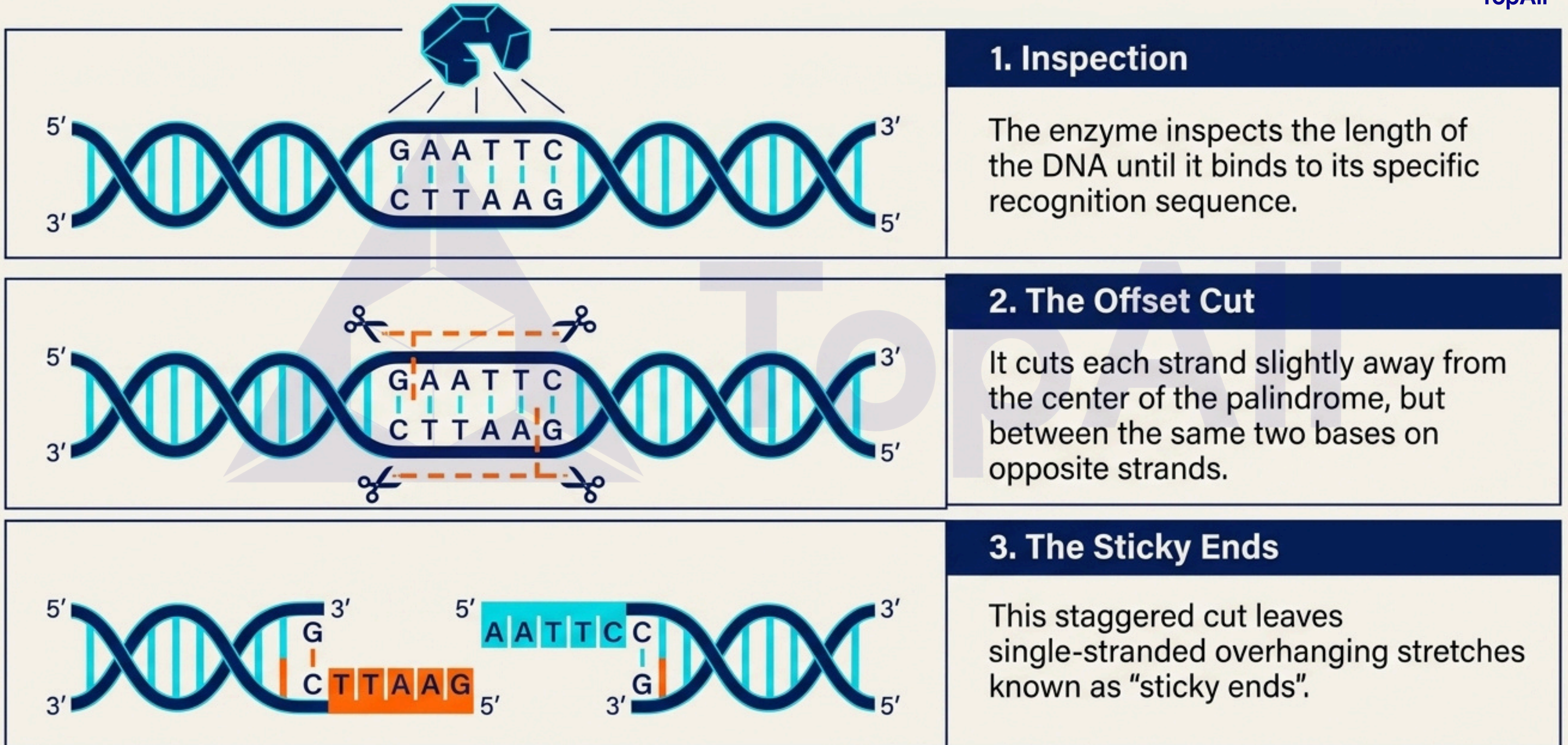
The convention for naming derives the first letter from the genus and the next two from the species of the prokaryotic cell of origin.

# The Palindromic Target

Restriction endonucleases specifically recognize these palindromic nucleotide sequences in the DNA, reading the identical base pairs on the two strands when the reading orientation (5' to 3') is kept the same.



# The Mechanism of EcoRI



# The Engineering Takeaway



When cut by the same restriction enzyme, fragments have complementary sticky ends. This 'stickiness' naturally forms hydrogen bonds, allowing the enzyme DNA ligase to permanently join their sugar-phosphate backbones, creating novel Recombinant DNA.



# You've Learned the Theory.

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