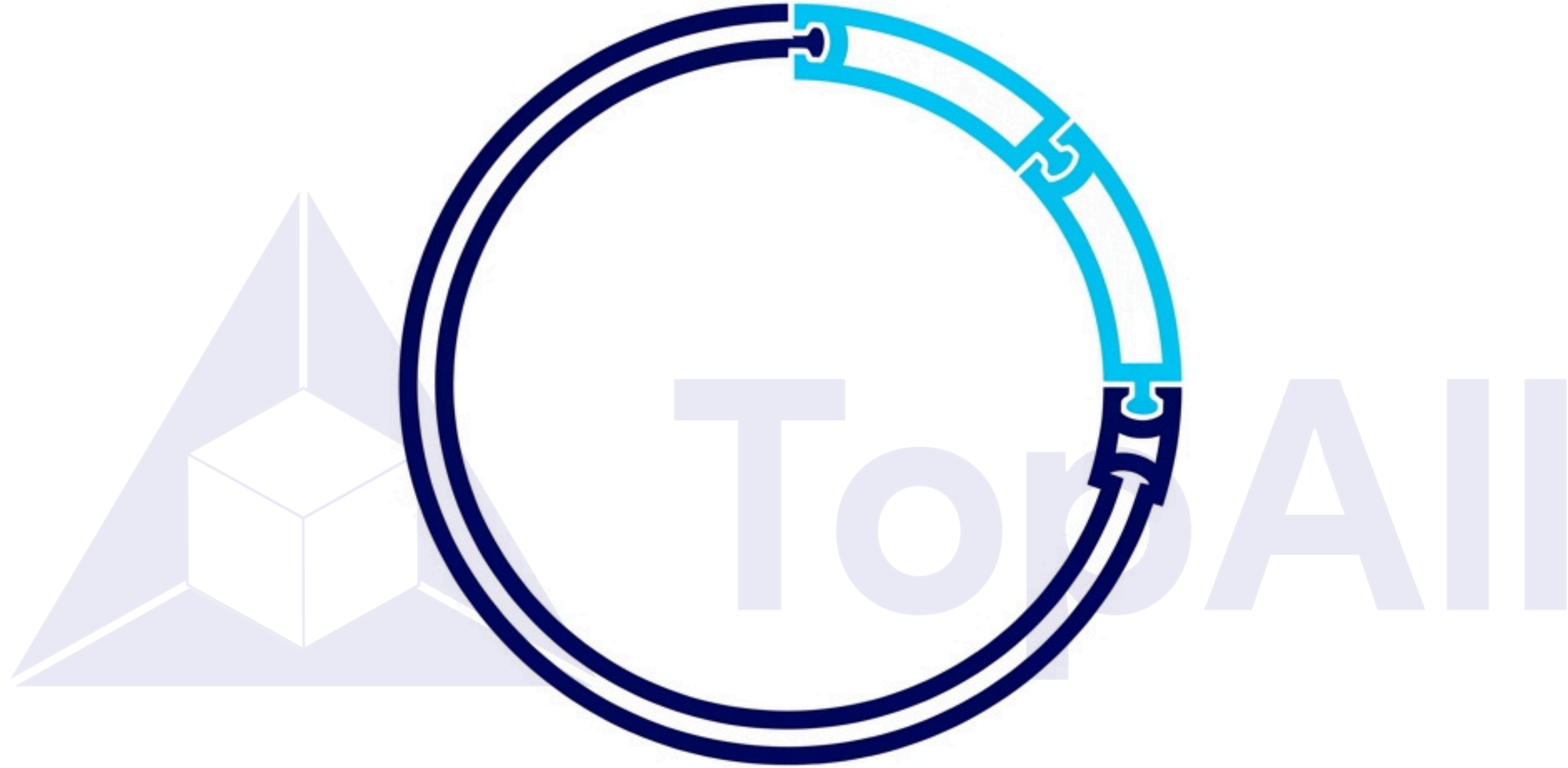


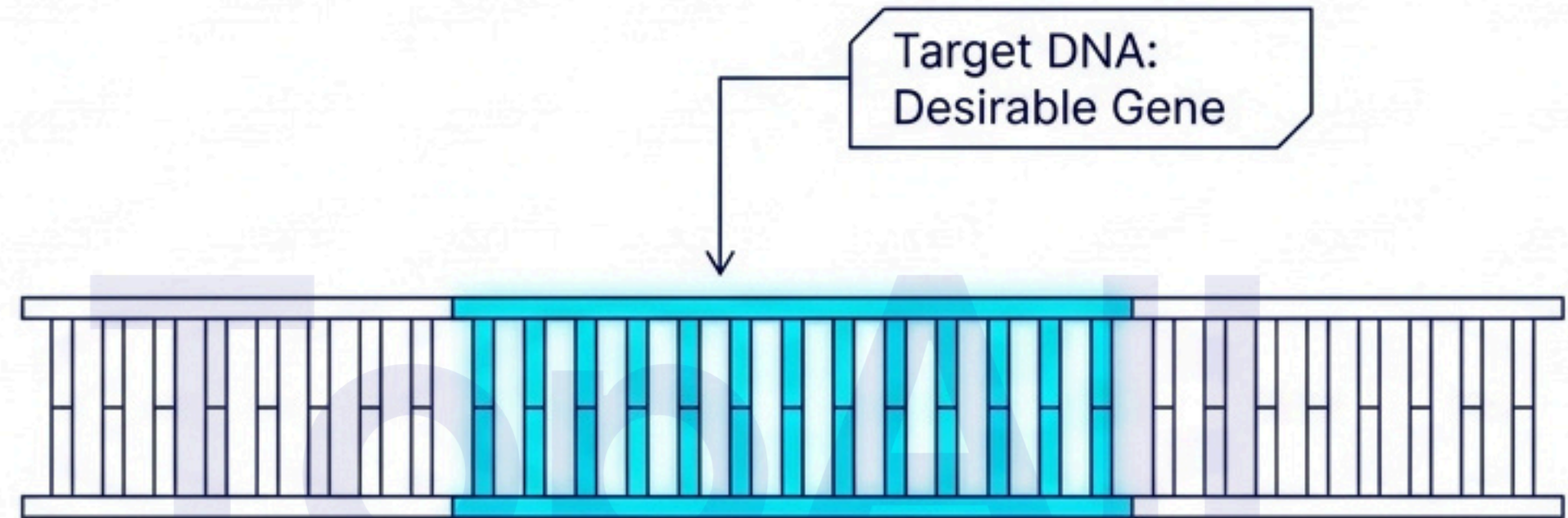


Construction of the First Recombinant DNA (1972)

How Stanley Cohen and Herbert Boyer engineered the foundation of modern biotechnology.

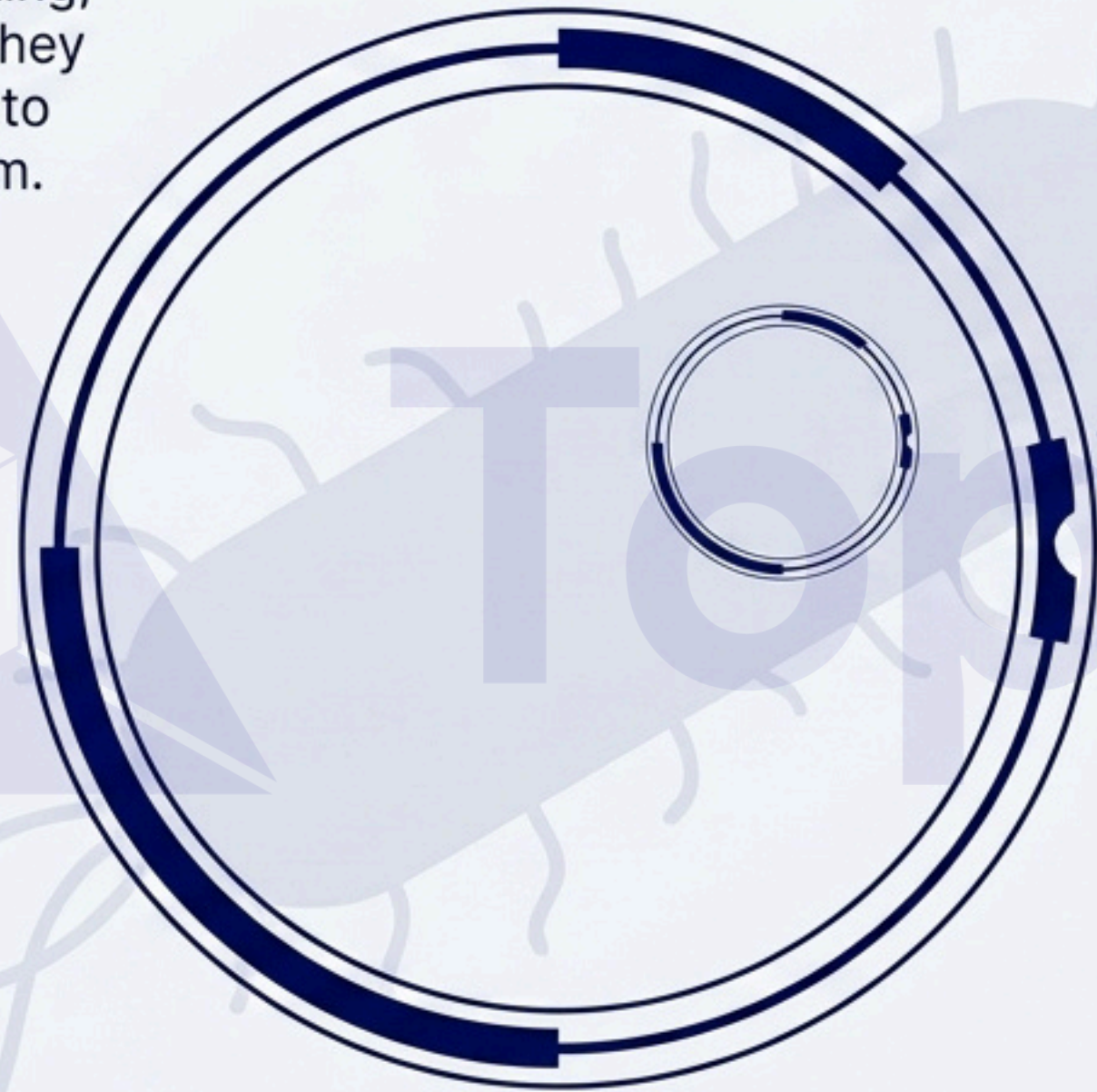
The Passenger: Antibiotic Resistance Gene

The source of the desired genetic trait. To create the first recombinant DNA, Cohen and Boyer targeted a specific piece of DNA encoding for antibiotic resistance, isolating it from a source plasmid.



The Vehicle: Native Plasmid of *Salmonella typhimurium*

Plasmids are autonomously replicating, circular extra-chromosomal DNA. They act as the perfect 'vehicle' (vector) to carry alien DNA into a host organism.



ori (Origin of Replication)

Crucial for initiating multiplication independent of chromosomal DNA.



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$$E=mc^2$$



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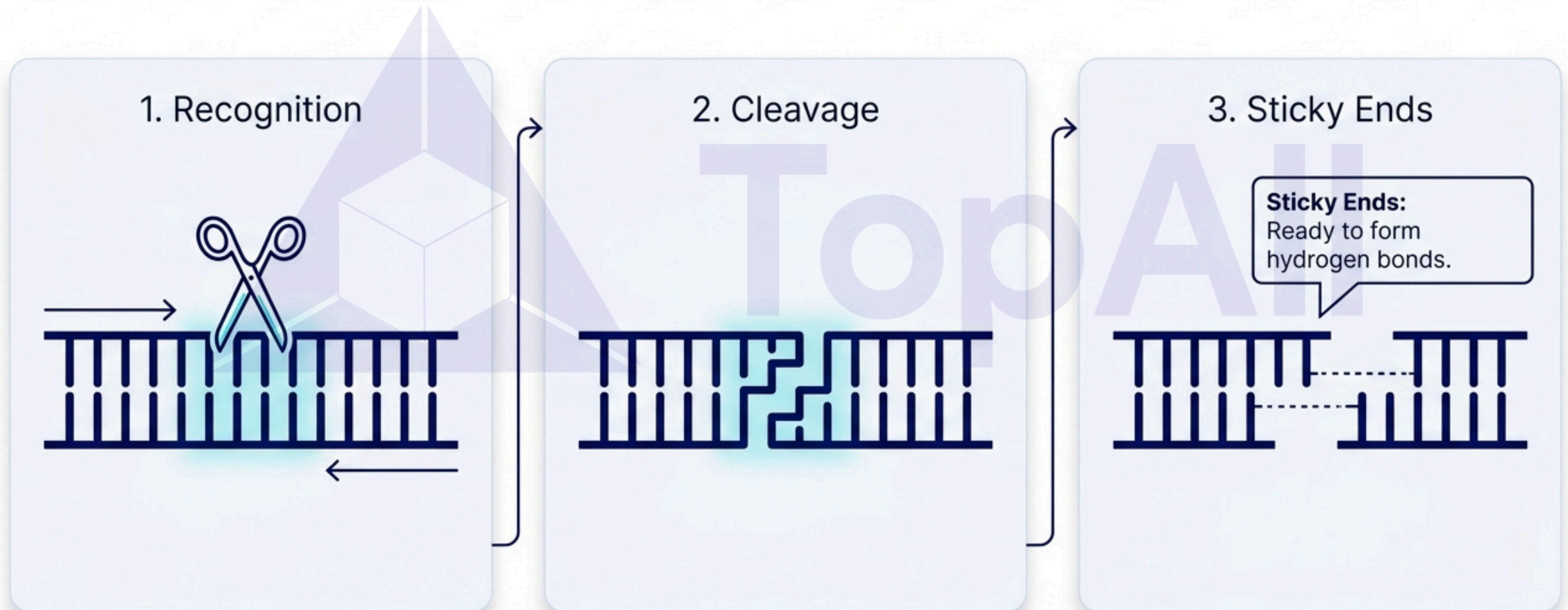
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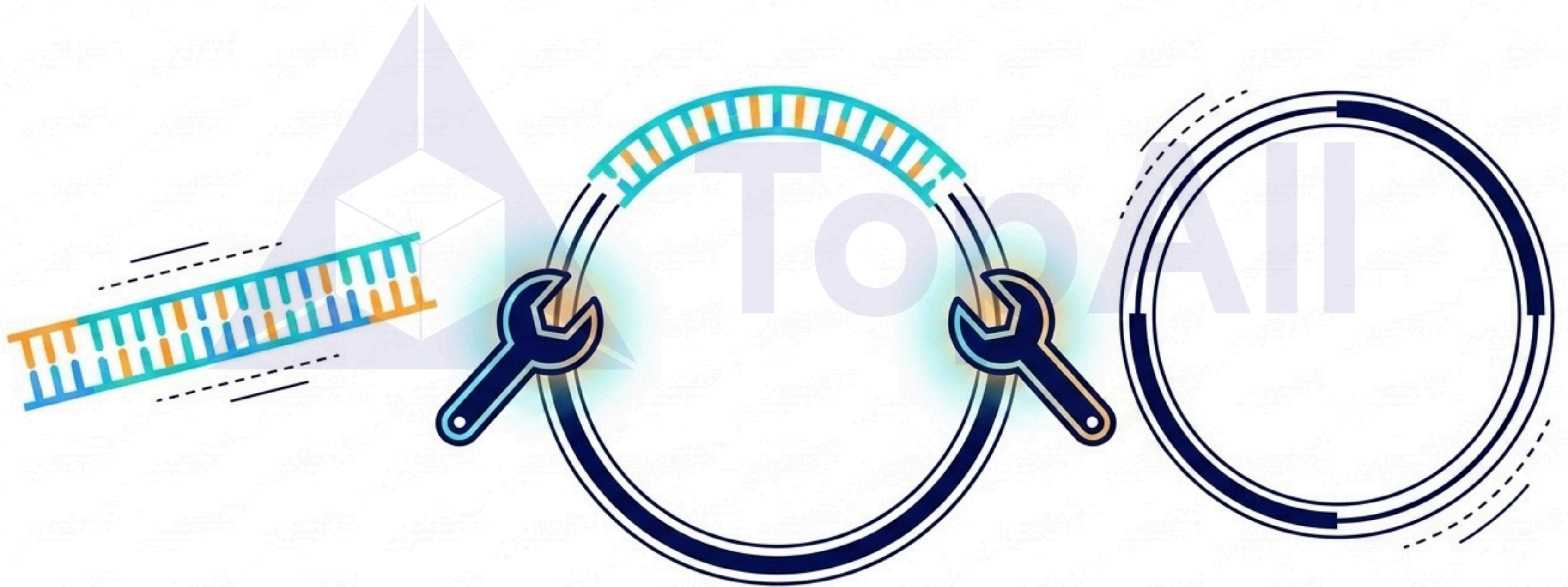
Molecular Scissors: Restriction Enzyme Cutting

Enzymes inspect DNA length and cut the sugar-phosphate backbone at specific recognition sequences, leaving precise ends for joining.



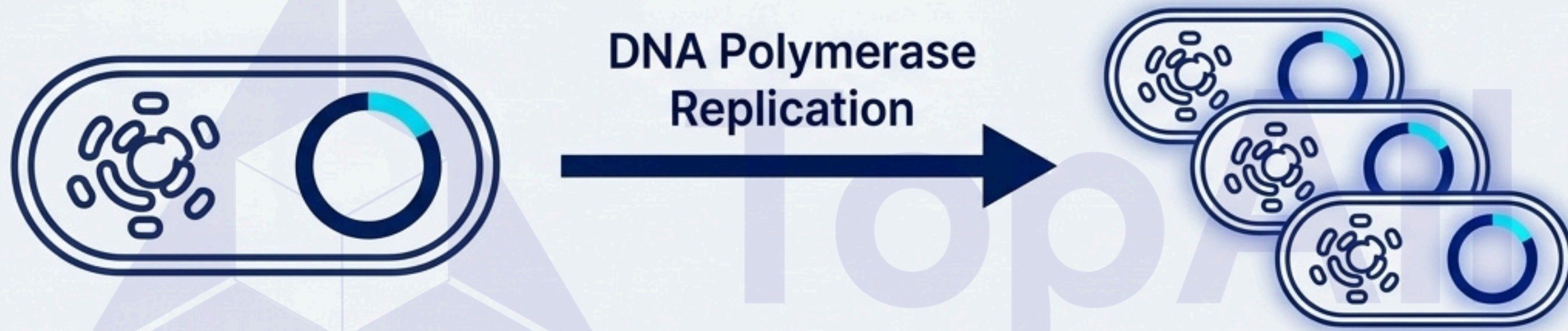
Molecular Glue: DNA Ligase Joining

The sticky ends of the target gene and the vector meet. DNA ligase acts as the glue, finalizing the sugar-phosphate bonds to create the artificial in vitro recombinant molecule.



The Factory: Transfer into E. coli and Cloning

The recombinant DNA is introduced into a host. The host's DNA polymerase takes over, replicating the plasmid to make billions of copies.



NEET Key Takeaway: 3 Basic Steps of Genetic Modification

1. Identify DNA with desirable genes.
2. Introduce the identified DNA into the host.
3. Maintain DNA in host and transfer to progeny.



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