ARTIFICIAL SYNTHESIS OF INSULIN

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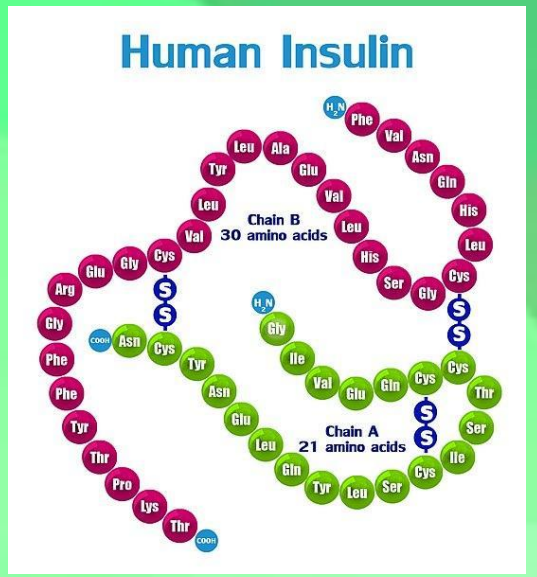
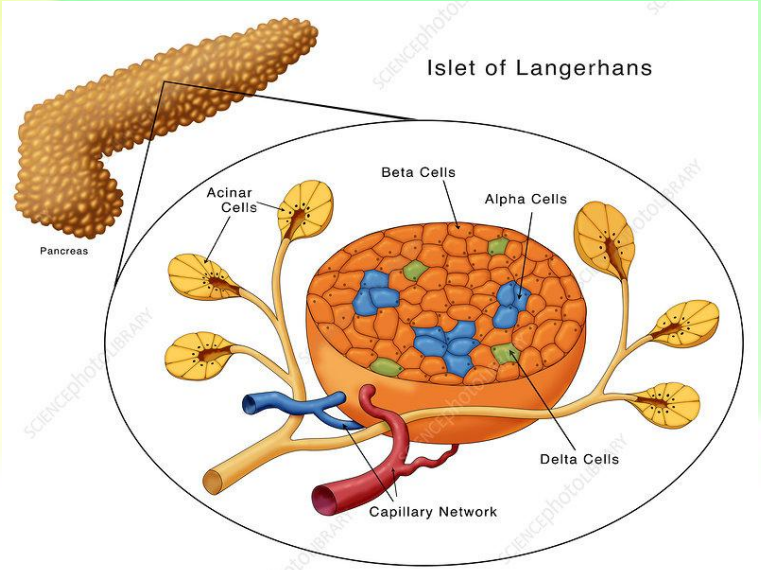
WHY IS IT SO IMPORTANT?

- Millions of diabetics worldwide use synthetic insulin to regulate their blood sugar levels.
- People who don’t produce the necessary amount of insulin have diabetes.
- People who suffered diabetes had no chance for a healthy life without synthetic insulin.
- Artificial synthesis of insulin is a serious step for the biotech industry and microbiology.





HISTORICAL QUESTION

Frederic G. Banting

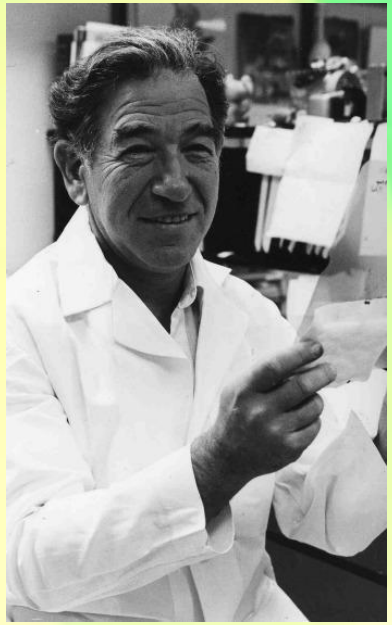
Charles F. Best

In 1921 Canadian scientists Frederic G. Banting and Charles F. Best successfully purified insulin from a dog's pancreas. Over the years scientists made continual improvements in producing insulin.

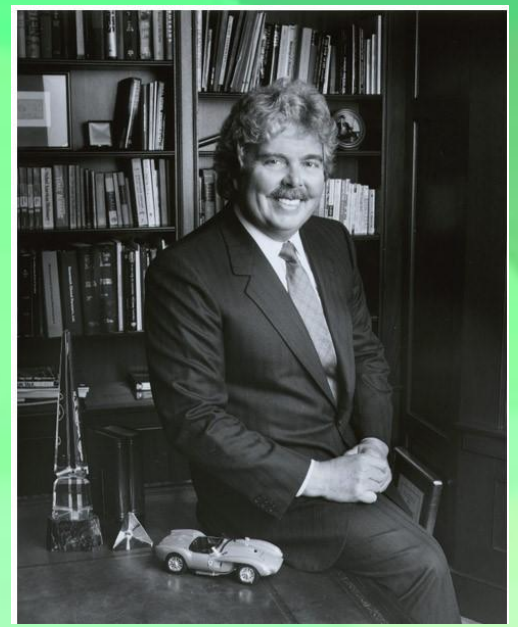
- In 1936 researchers found a way to make insulin with a slower release in the blood thanks for protamine.
- In 1950 researchers produced a type of insulin that acted slightly faster and does not remain in the bloodstream as long.
- In the 1970s, researchers began to try and produce an insulin that more mimicked how the body's natural insulin worked.
- In the 1980s, researchers used genetic engineering to manufacture a human insulin.

INSULINE AND GENETIC ENGEERING

- In 1982 thanks for work of biochemists Stanley Cohen and Herbert Boyer was produced a human insulin that became the first approved genetically engineered pharmaceutical product.
- Human insulin is grown in the lab inside Escherichia coli.
- Recombinant DNA is a technology scientists developed that made it possible to insert a human gene into the genetic material of a common bacterium.



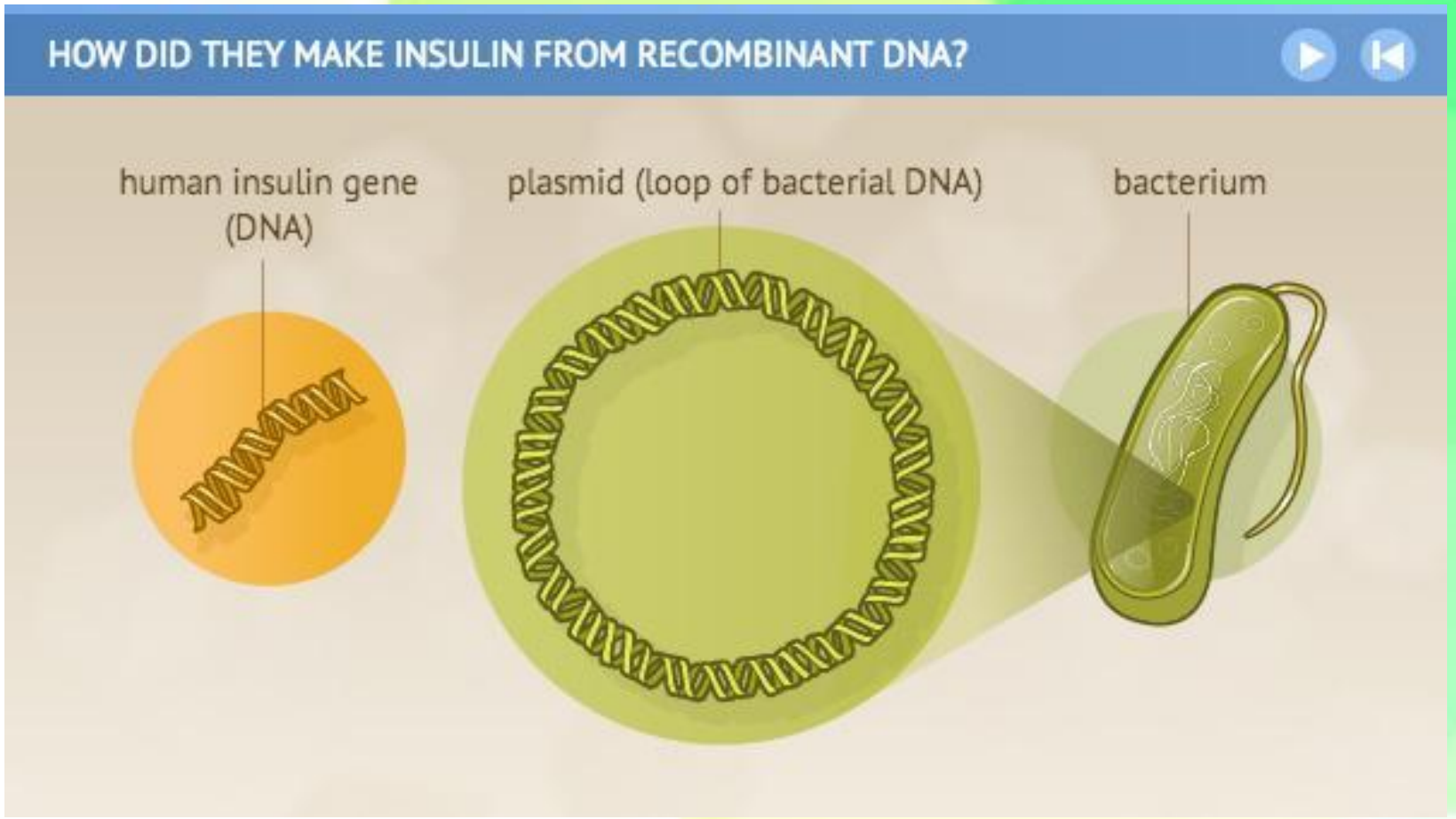
Stanley Cohen



Herbert Boyer

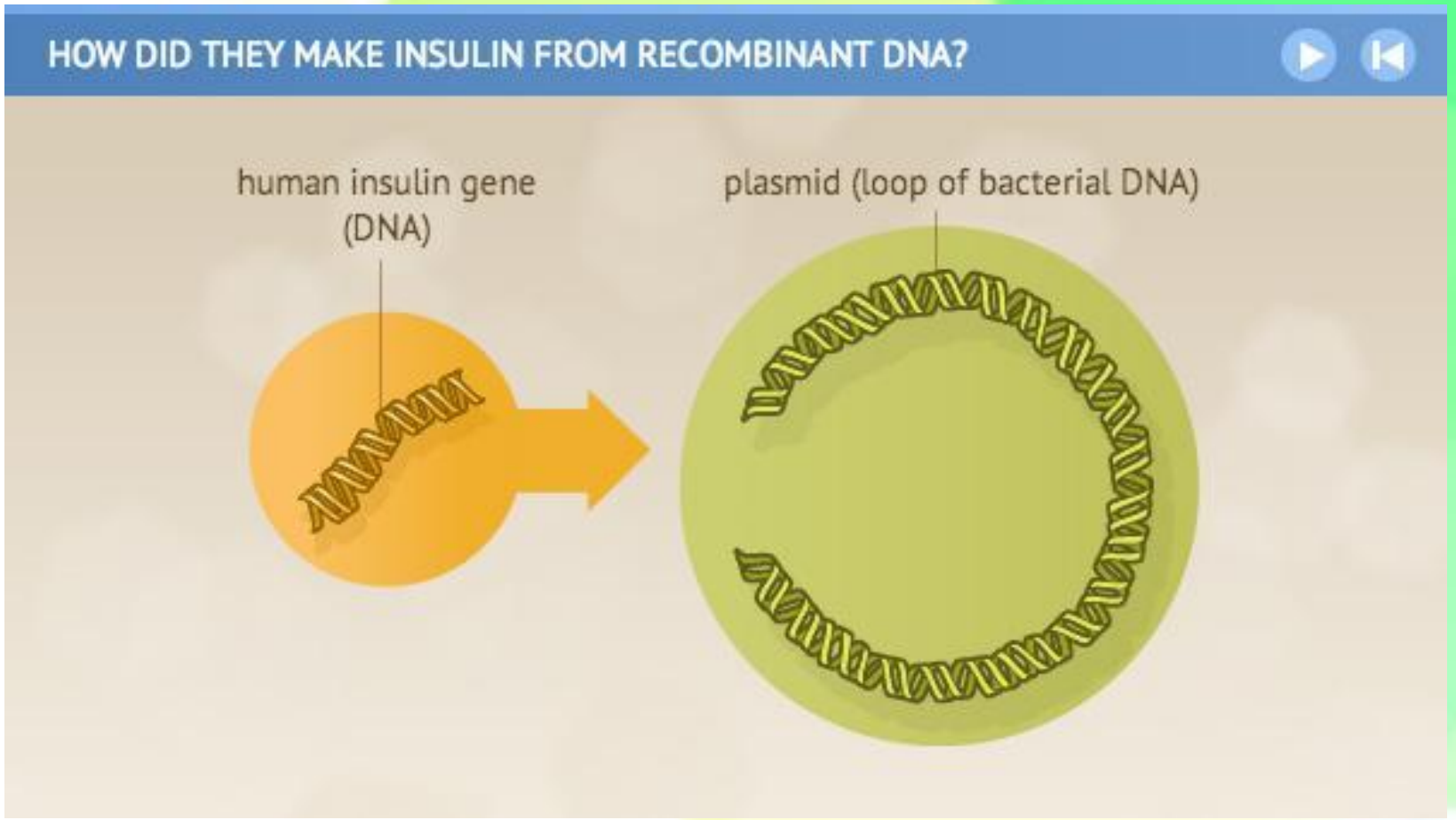
SYNTHESIS OF INSULIN FROM RECOMBINANT DNA

STEP 1



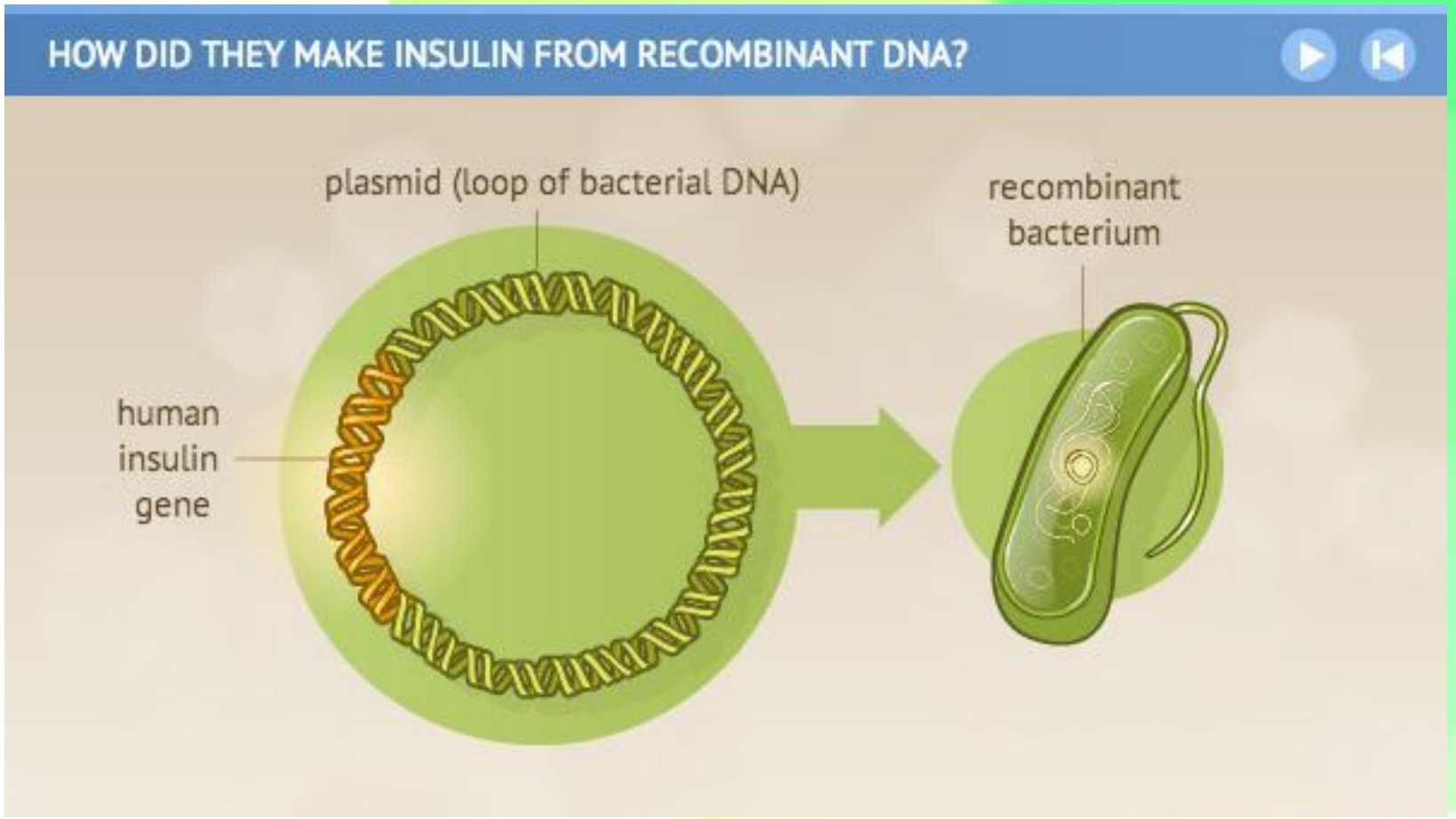
Scientists built the human insulin gene in the laboratory.

STEP 2



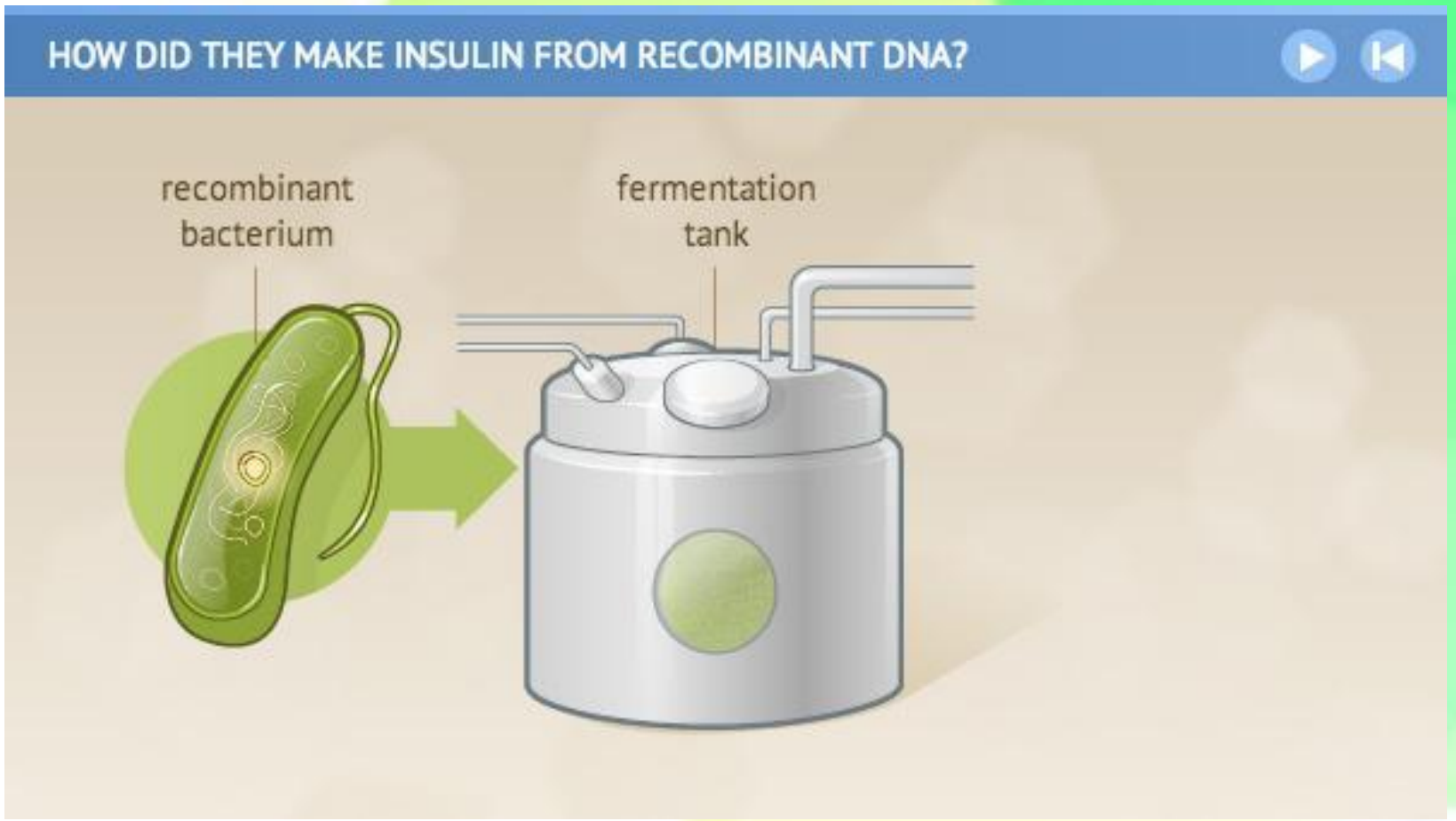
Then they remove a loop of bacterial DNA known as a plasmid and insert the human insulin gene into the plasmid.

STEP 3



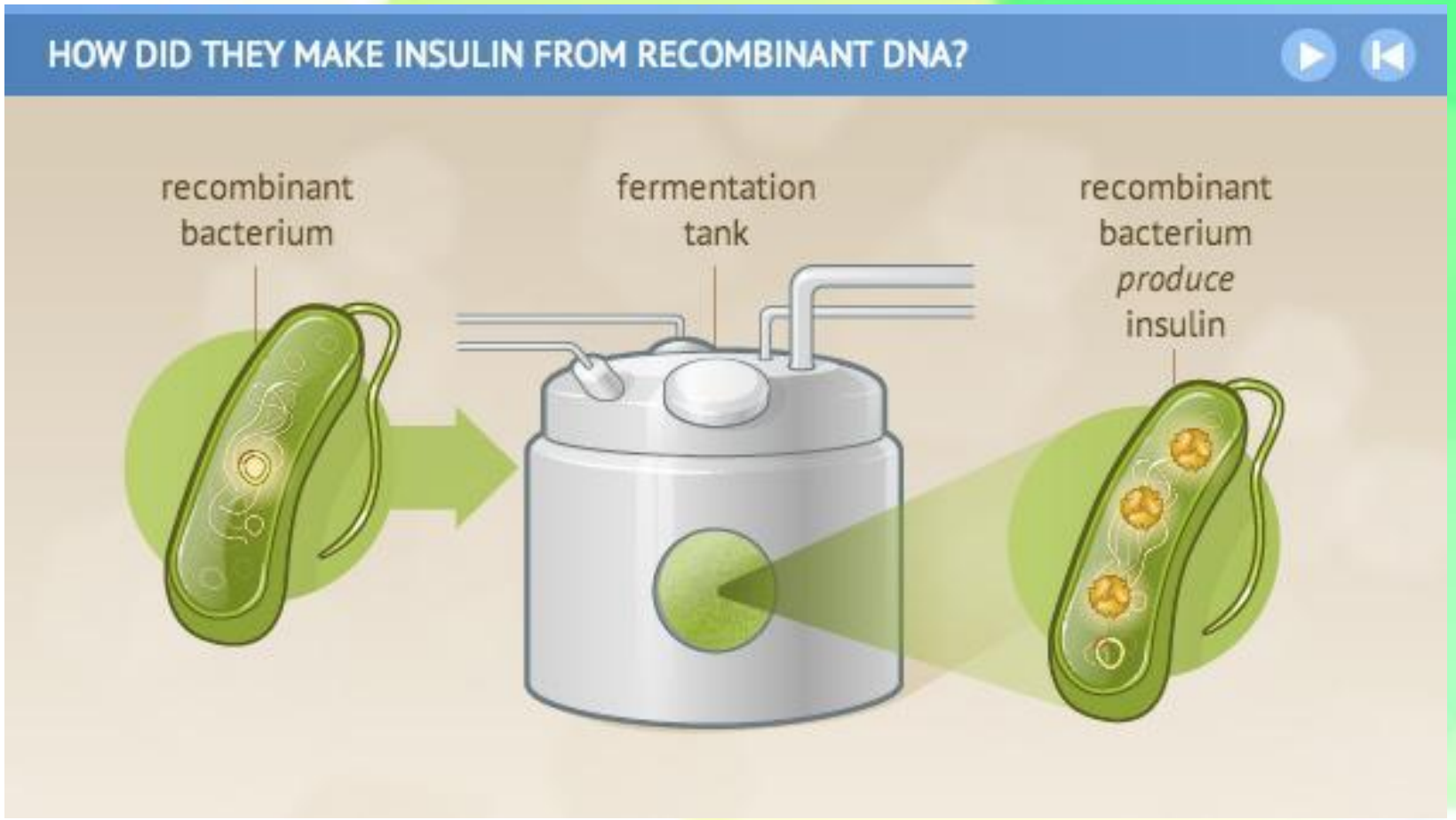
Scientists return the plasmid to the bacteria…

STEP 4



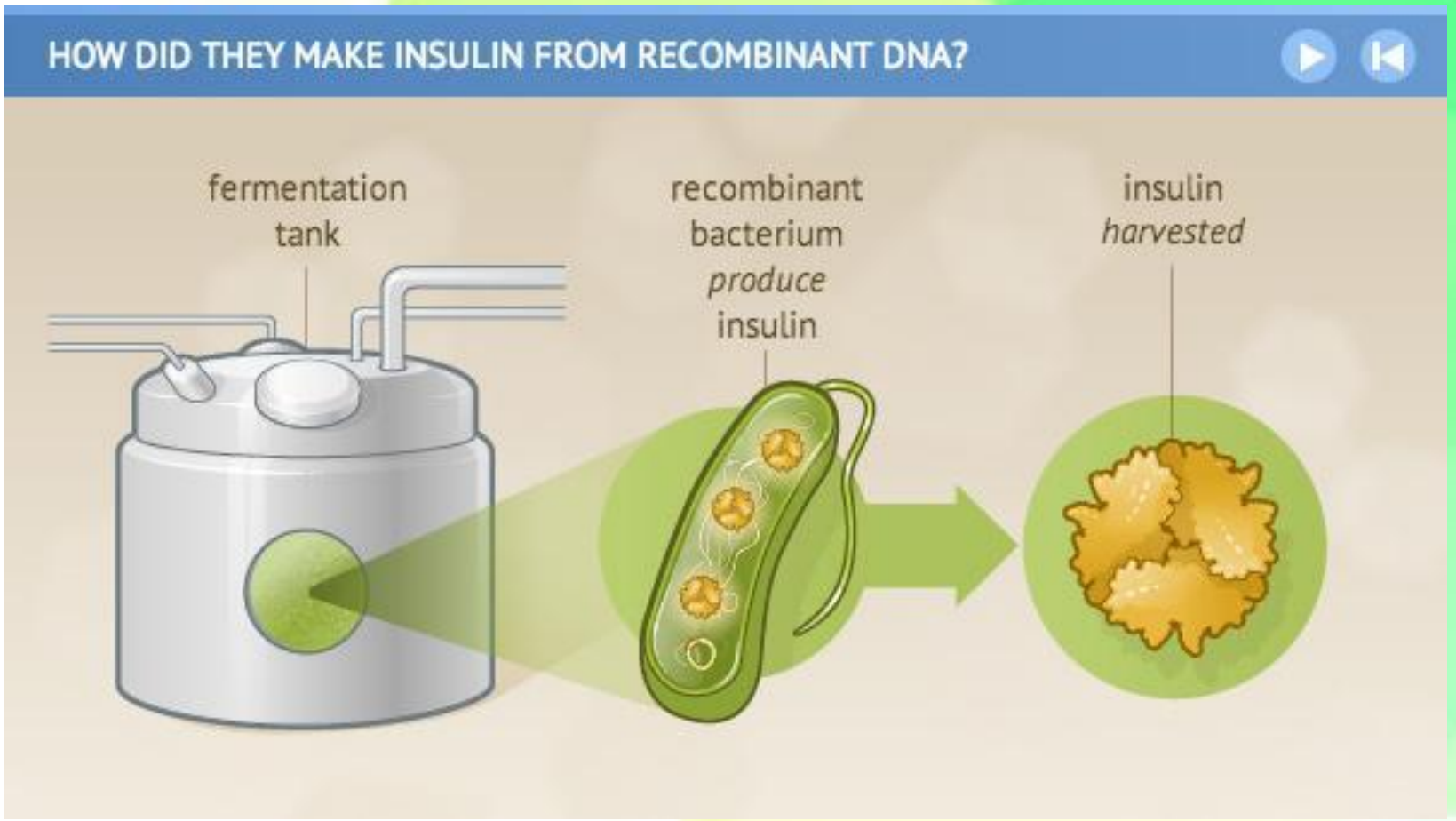
And put the «recombinant» bacteria in large termination tanks.

STEP 5



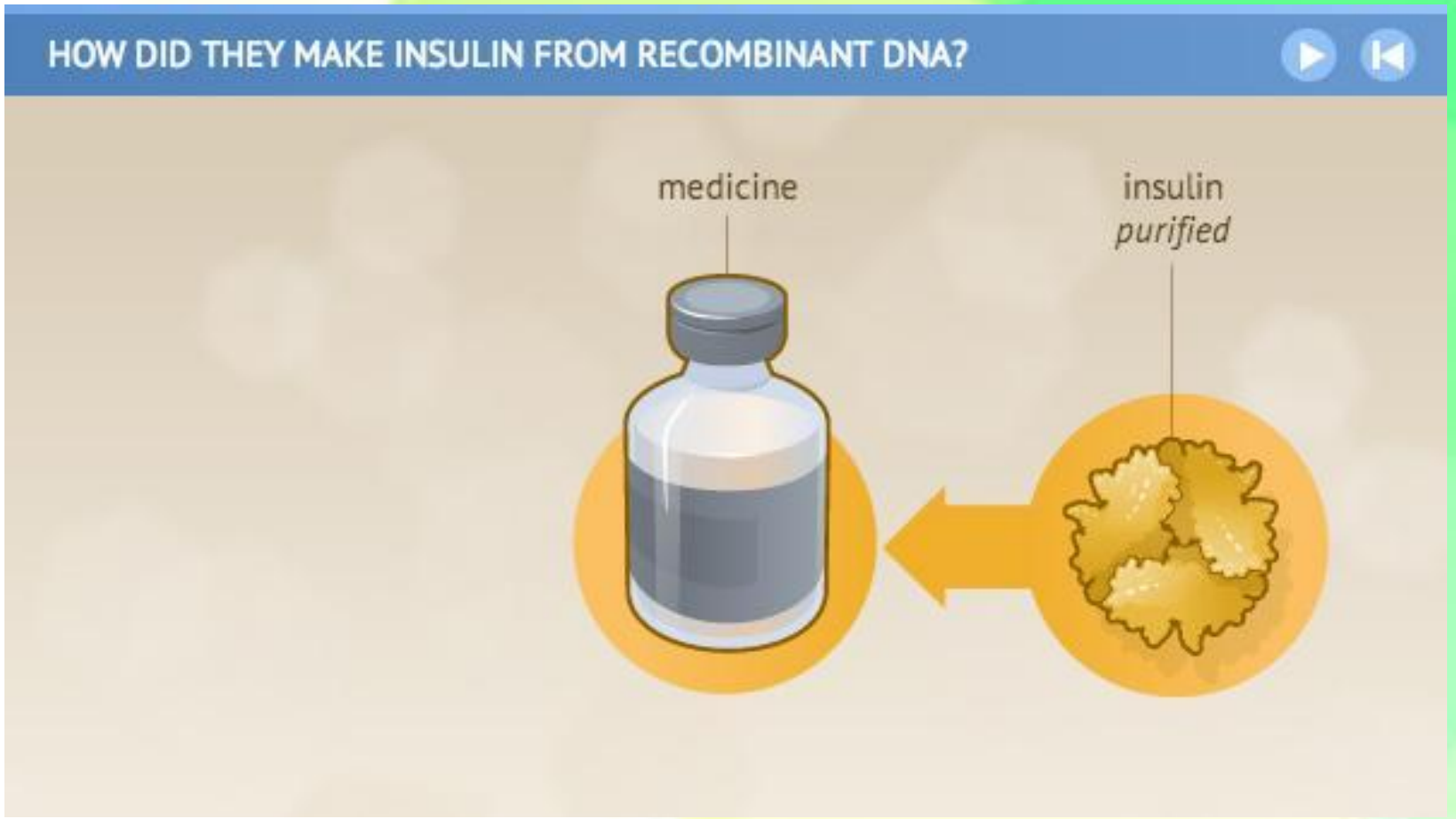
There the recombinant bacteria use the gene to begin producing human insulin.

STEP 6



Scientists harvest the insulin from the bacteria…

STEP 7



And purify the substance for use as a medicine for people.