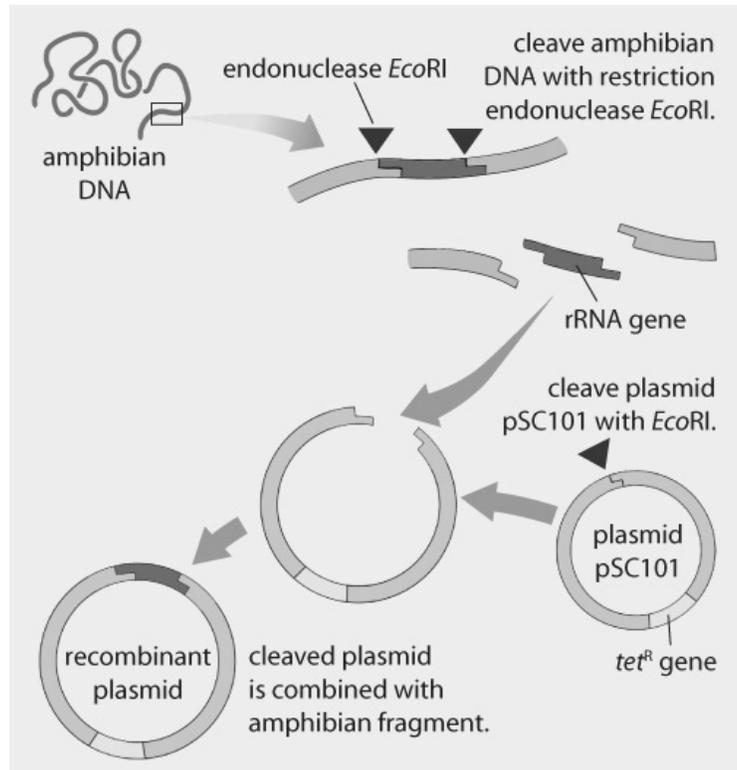


## Thought Lab 18.4: Recreating the First Chimera

**Purpose:** Performing a simulation to demonstrate the use of restriction endonucleases and DNA ligases.

In genetic engineering, a chimera is a genetically engineered organism that contains DNA from unrelated species. The first chimera was created in 1973 by the American team of Stanley Cohen and Herbert Boyer. Bacteria were then exposed to the recombinant plasmid. Those bacteria that displayed tetracycline resistance had taken up the plasmid. In Cohen and Boyer's experiment, the amphibian gene coded for the production of rRNA. The bacterial gene *tetR* conferred resistance to the antibiotic tetracycline. They used the restriction endonuclease *EcoR*I and DNA ligase to splice (insert) a gene from a toad into a molecule of bacterial DNA plasmid pSC101.



### Procedure

1. Study the illustration of the Cohen-Boyer experiment. Make a list of the materials that the researchers used.
2. Develop a plan to simulate the experiment. Show how you will use materials in your classroom to represent the materials that Cohen and Boyer used. Then perform your simulation.

### Analysis

1. How did your simulation illustrate the action of an endonuclease and a ligase? In what ways was your simulation effective? What were its limitations?

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2. The Cohen-Boyer experiment was important because it created a colony of bacterial cells that were resistant to the antibiotic tetracycline and produced amphibian rRNA. What other bacterial phenotypes would have resulted from this experiment? What would each phenotype indicate about events at the molecular level?

3. a) Give one example of how you might use this technology for a social or industrial purpose.

b) What environmental, social, or ethical issues would your experiment raise? Make a list of these issues, and discuss them with other students in your class.