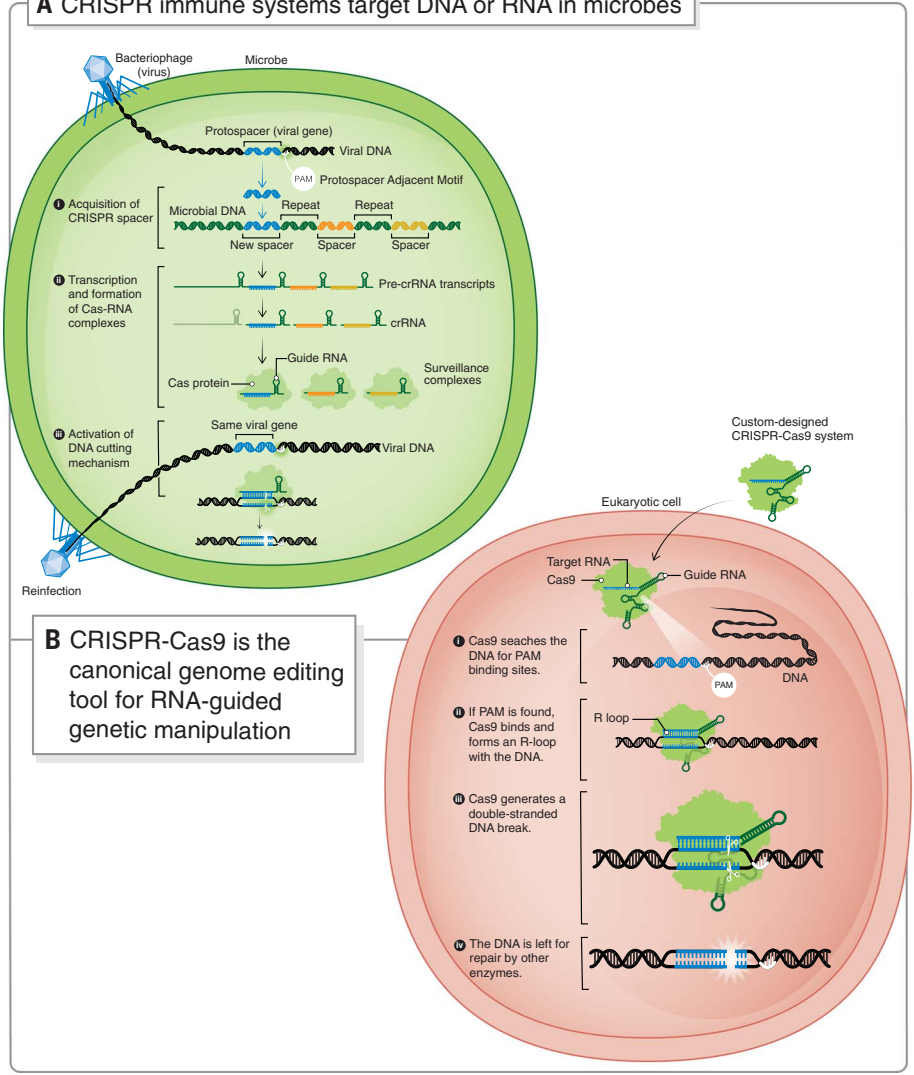
A CRISPR immune systems target DNA or RNA in microbes
Bacteriophage (virus)
Microbe
Protospacer (viral gene)
Viral DNA
PAM
Protospacer Adjacent Motif
i Acquisition of CRISPR spacer
Microbial DNA
Repeat
Repeat
New spacer
Spacer
Spacer
ii Transcription and formation of Cas-RNA complexes
Pre-crRNA transcripts
crRNA
Guide RNA
Cas protein
Surveillance complexes
iii Activation of DNA cutting mechanism
Same viral gene
Viral DNA
Reinfection
B CRISPR-Cas9 is the canonical genome editing tool for RNA-guided genetic manipulation
Custom-designed CRISPR-Cas9 system
Eukaryotic cell
Target RNA
Cas9
Guide RNA
i Cas9 seaches the DNA for PAM binding sites.
DNA
PAM
ii If PAM is found, Cas9 binds and forms an R-loop with the DNA.
R loop
iii Cas9 generates a double-stranded DNA break.
iv The DNA is left for repair by other enzymes.