Circularly permuted phage

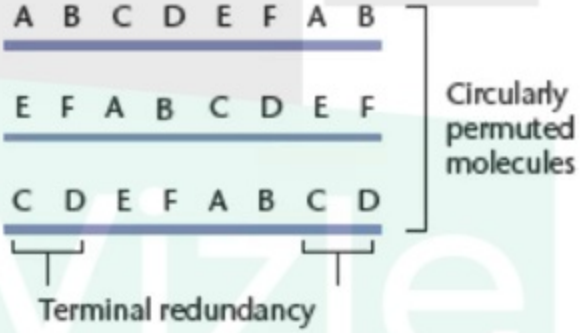
See Chapter 7 – Bacteriophage
pp. 119 – 121 for a discussion of phage P1

Circularly permuted / terminally redundant phage

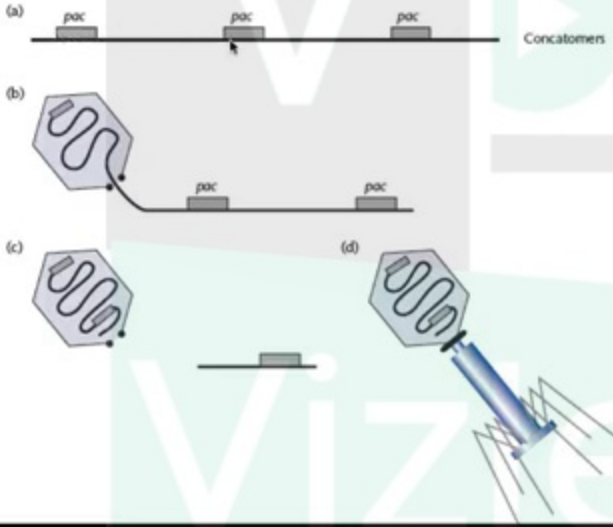
- Most of the mycobacteriophage we work with are:
  - Linear DNA molecules in the phage head
  - That circularize through *cos* sites to form a circular model in the host cytoplasm
- Some phage lack cos sites yet still form circular molecules upon injection into the host. They have circularly permuted genomes.
  - Coliform phage P1 and P22
  - Mycobacteriophage from cluster B
  - Cuke

Terminally redundant genomes means you find the same sequence on each end.

Circularly permuted genomes means order of genes, though the same for each phage, starts in a different place.

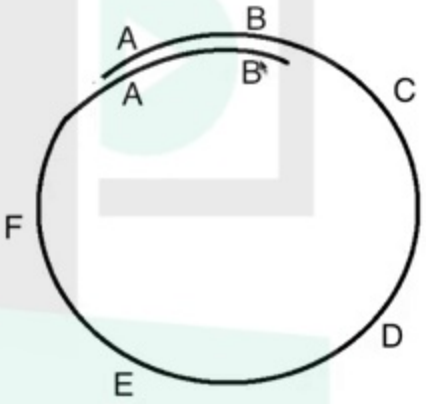


Circularly permuted phage are created at packaging by the phage packaging "headfulls" rather than cleavage at *cos* sites.



In phage P22 the redundancy is about 2% of the genome. For Cuke?

When the linear DNA from the phage gets injected into the host the redundant ends pair with each other.



- Because each phage particle contains a phage genome that starts in a unique place there is no common base #1 to which all the genes can be indexed.
- The phage community decided to assign position #1 to the first nucleotide of the coding region of the terminase. Terminase is usually one of the first ORFs on the left arm of phage with *cos* sites.
- This puts all the structural genes on the left arm as they are for the other phage we study.

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