(Very) Basic Molecular Biology

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Each human cell has 46 chromosomes
--double-helix DNA molecule

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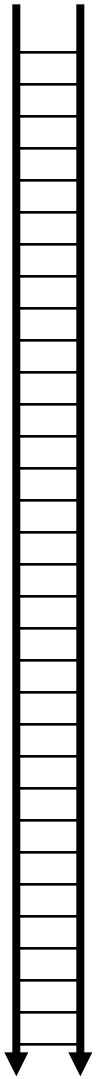

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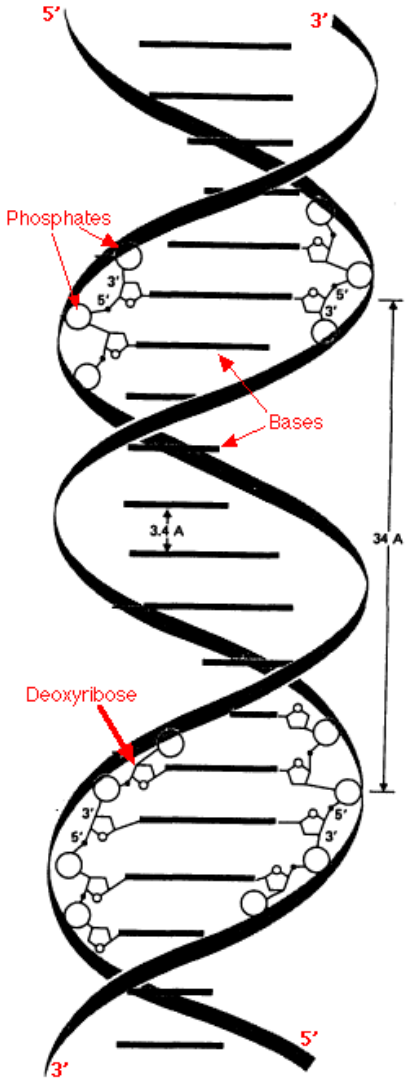

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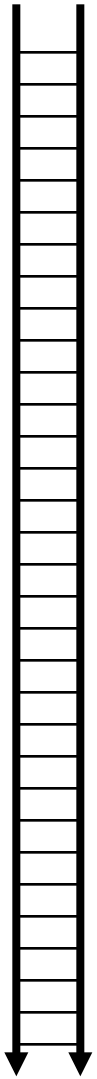

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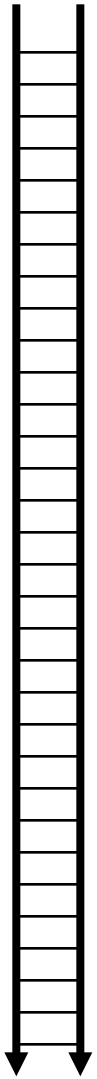

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--double-helix DNA molecule
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(adenine, guanine, cytosine, and thymine)

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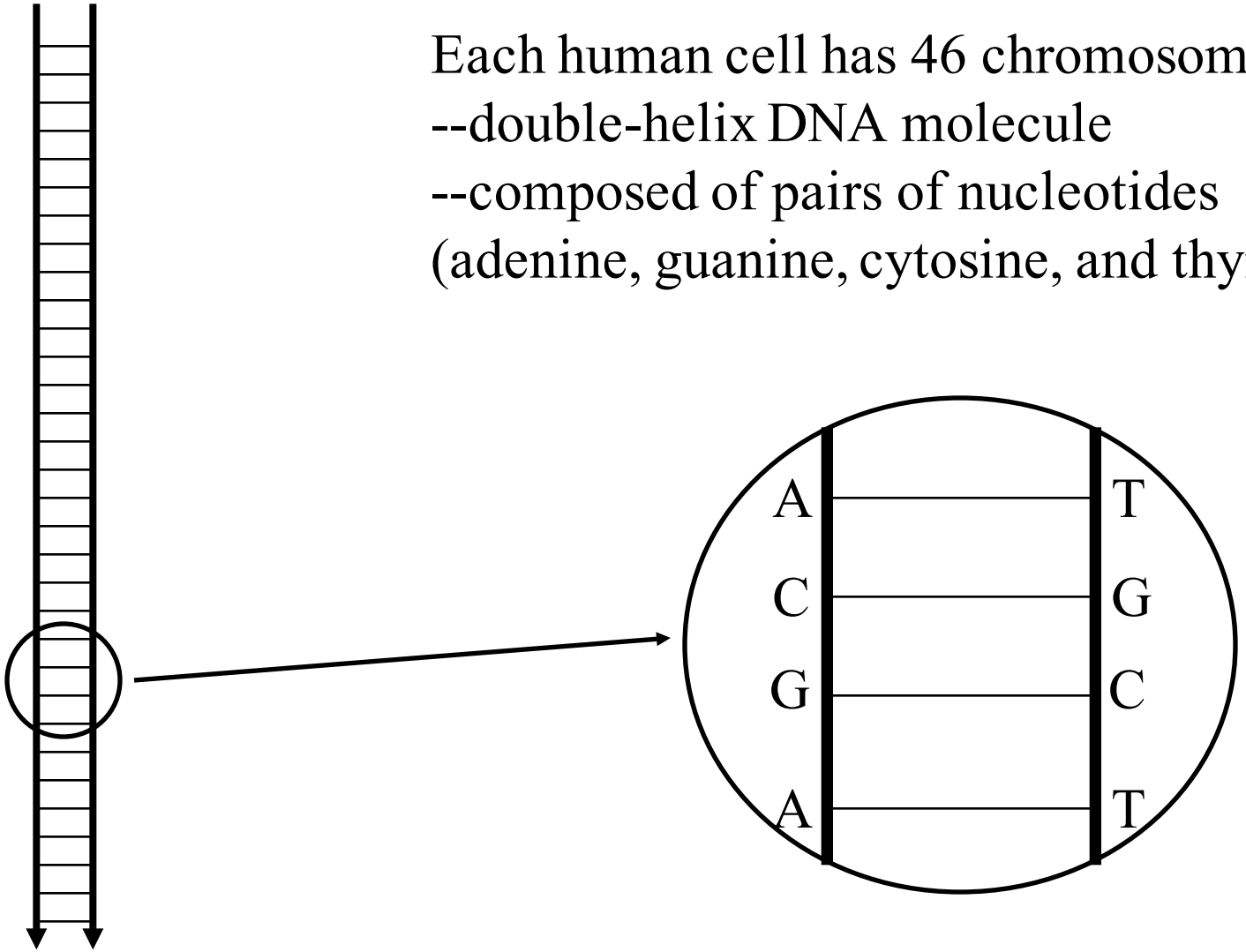

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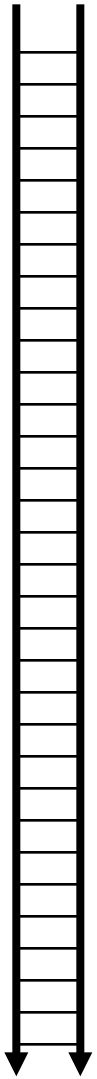

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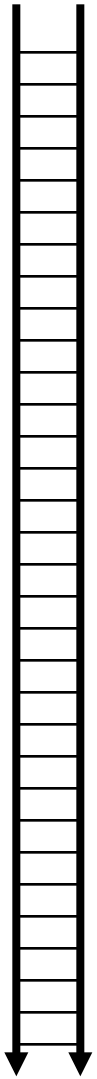

Chromosomes are divided into
50,000 - 100,000 genes

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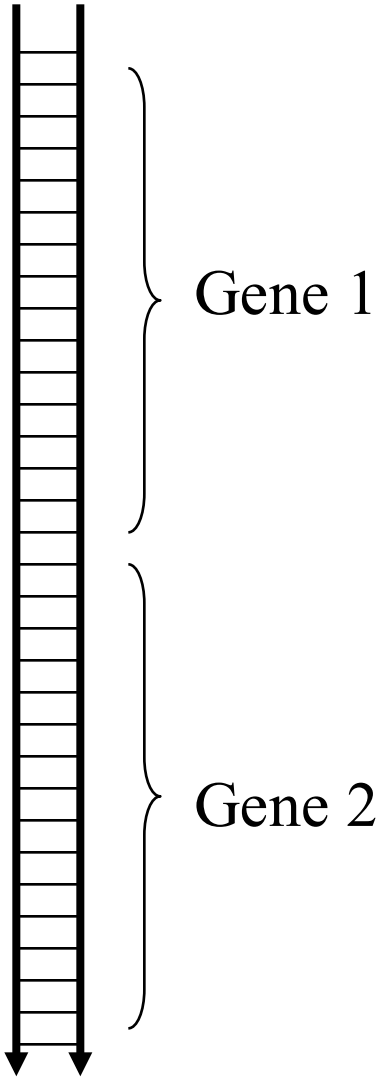

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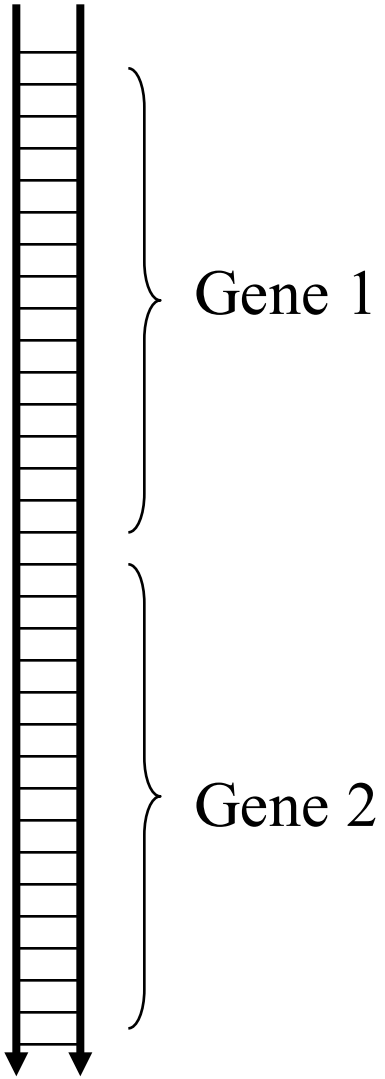

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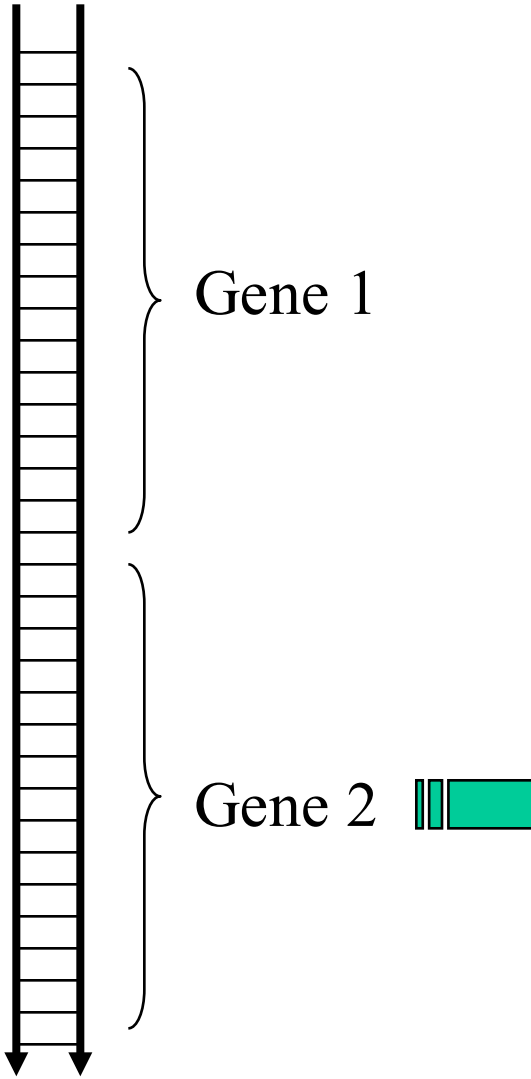

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Protein A

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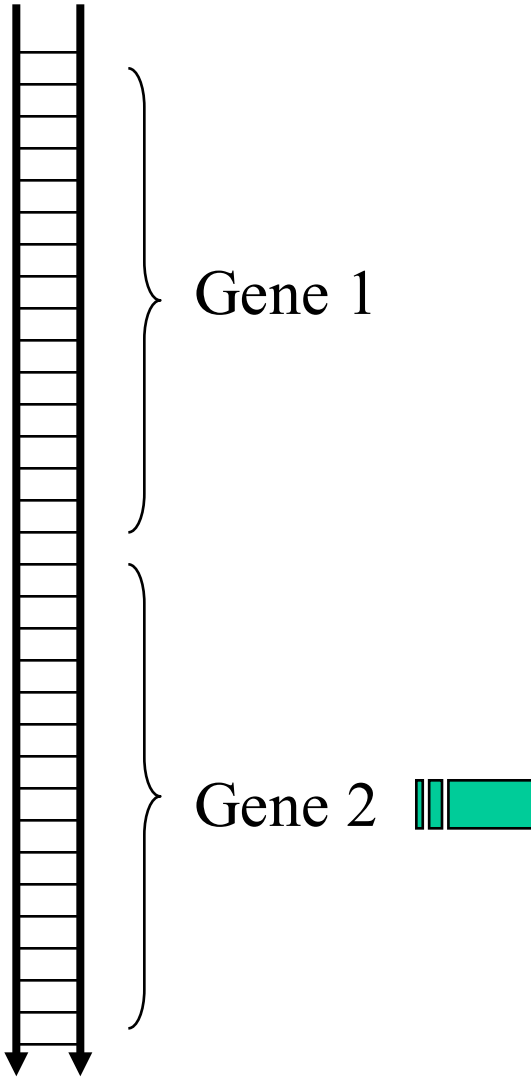

Chromosomes are divided into
50,000 - 100,000 genes,
each of which codes for a particular
protein, using an alphabet of
20 amino acids

Protein A

Biotechnological procedures include:

- Exposing organisms to mutation-producing stresses and selecting for desirable variations
- Determining the gene that produces a particular protein
- Recombinant DNA
- Genetic Testing

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Chrysanthemum

- Gamma radiation, producing “peach” chrysanthemum


Peach John Wingfield

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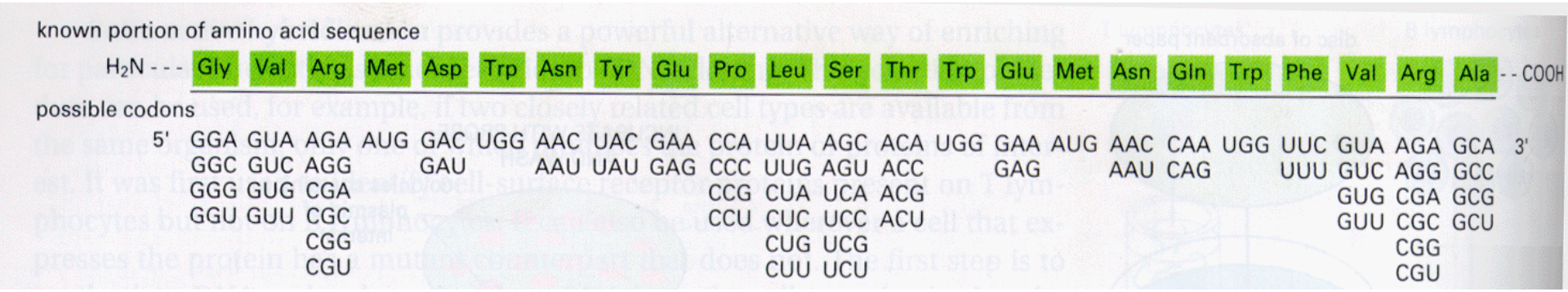
Redundancy

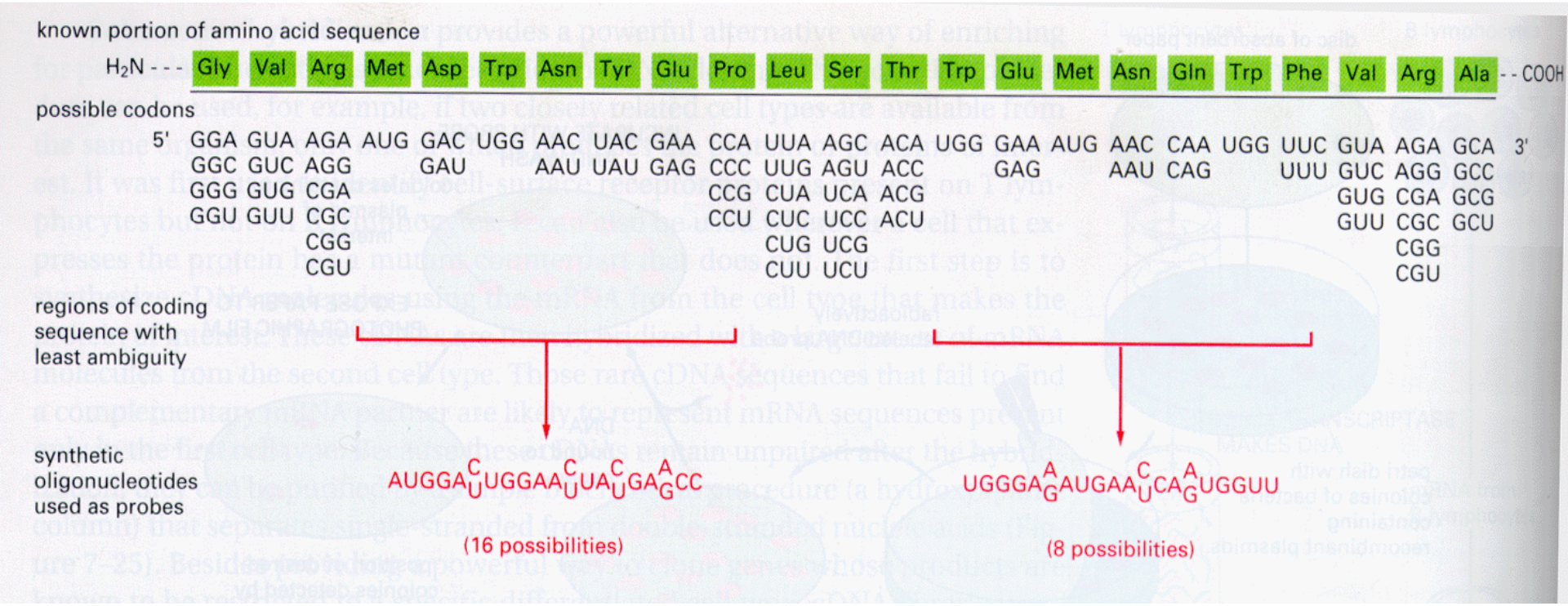
- Nucleotides are “read” in groups of 3 pairs, called codons
  - e.g., AAT, CGA, TGA
- Each codon codes for a particular amino acid
- Because there are 64 codons and only 20 amino acids, many acids can be produced by more than one codon
- Result: you cannot infer the structure of a gene from the sequence of amino acids in the protein it produces

Redundancy



Source: Alberts et al., *Molecular Biology of the Cell*

Using probes to mitigate redundancy



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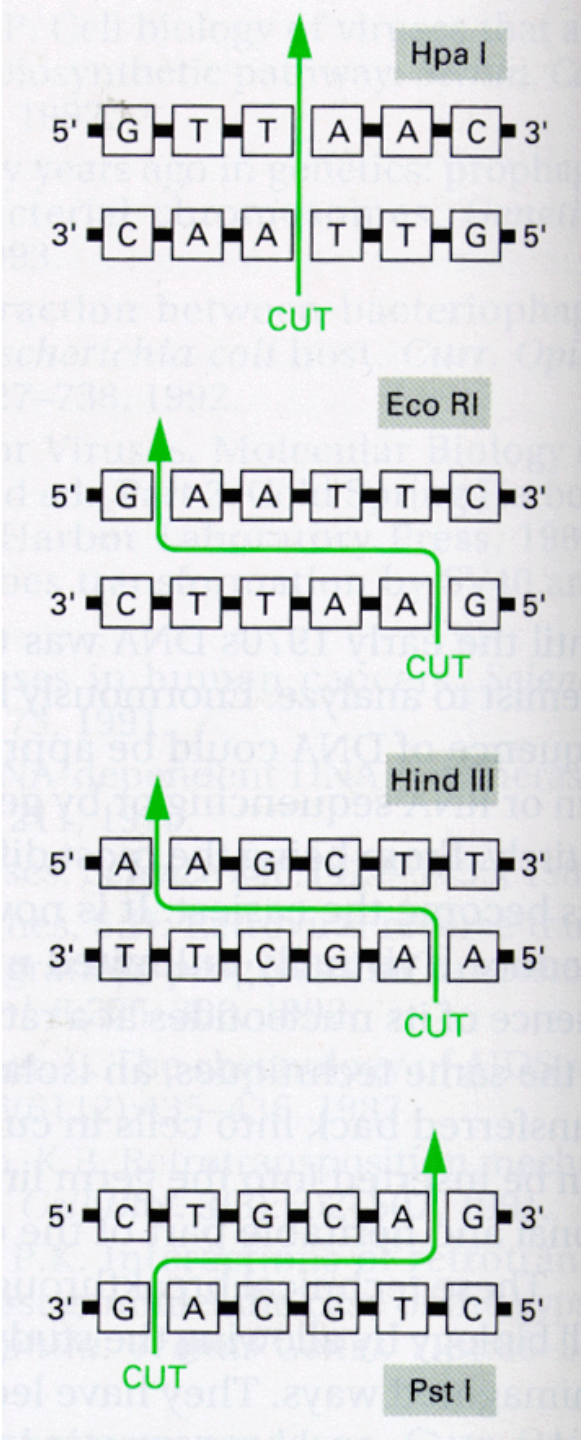
Cutting DNA



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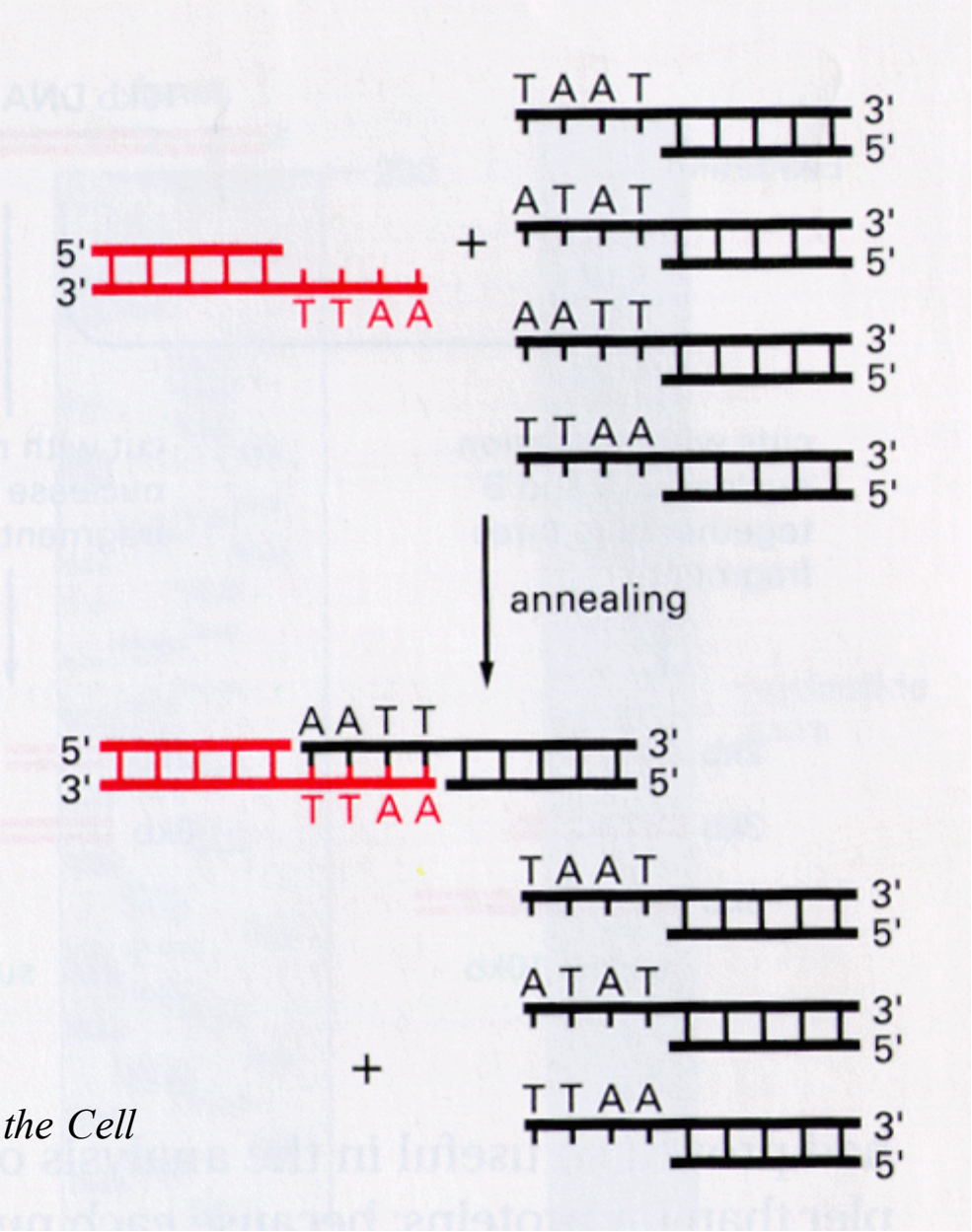
"Sticky Ends"



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(a) Better for eating
(b) Susceptible to human diseases – for testing
(c) Factories for hormones useful to people
(d) Perform socially useful functions
(e) (perhaps) generate organs suitable for transplantation

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