

GENETIC ELEMENTS

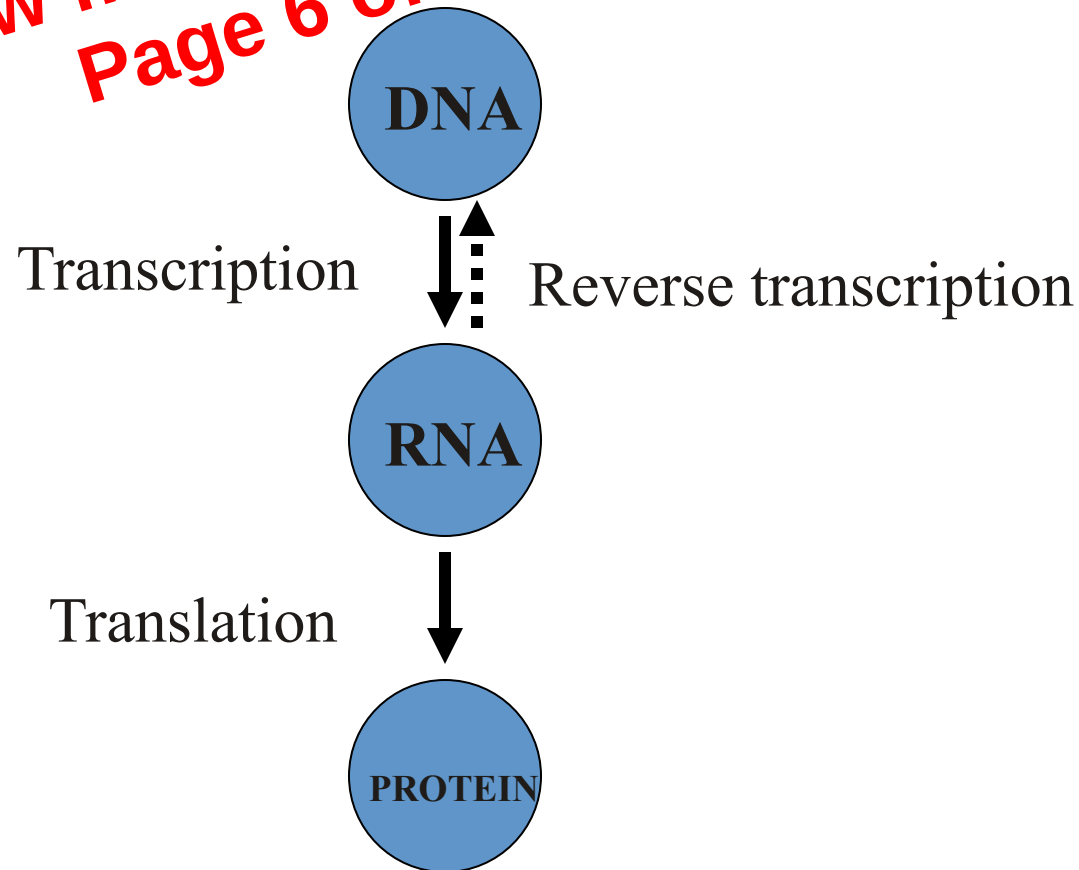
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Page 5 of 64

EUKARYOTES

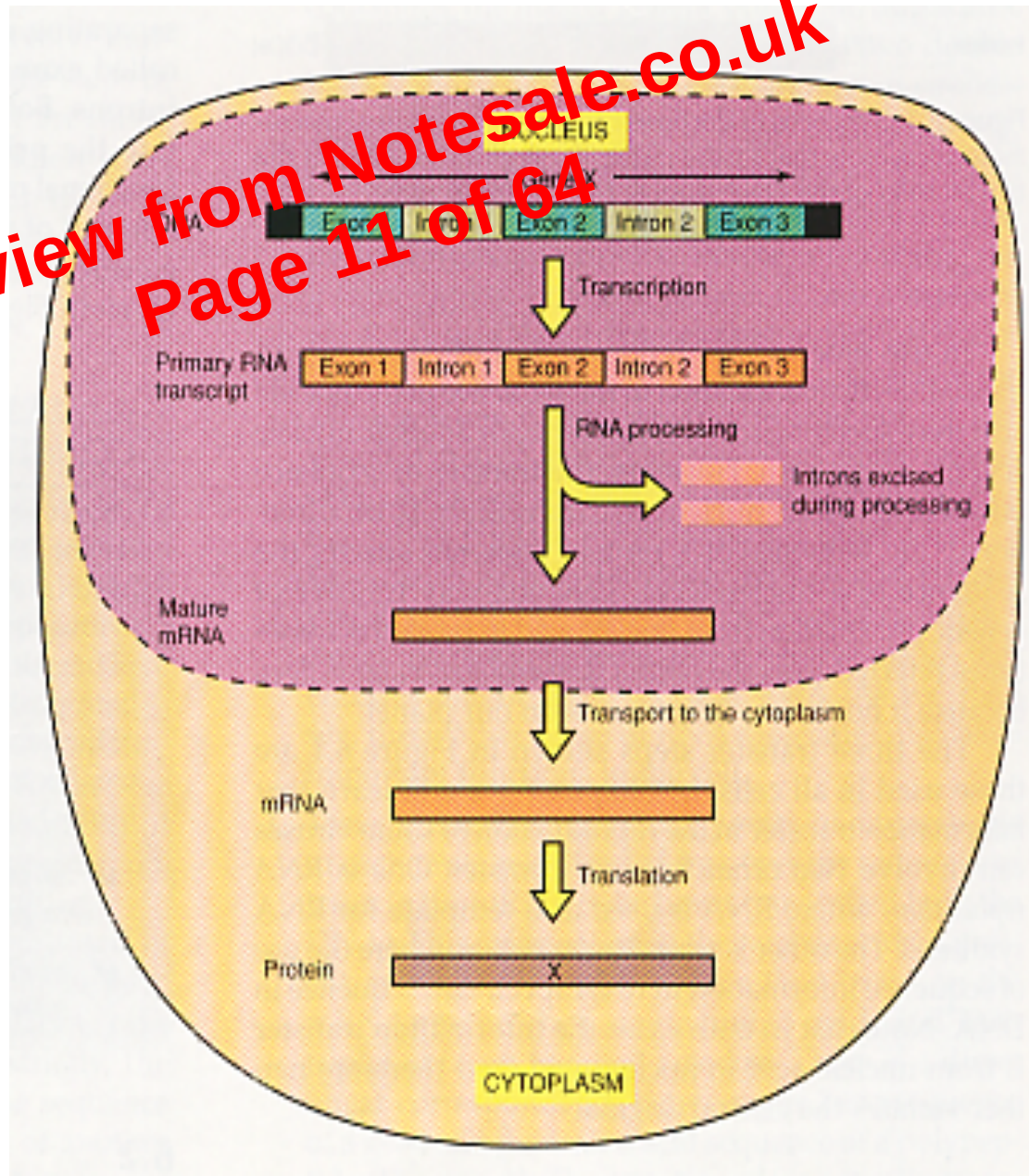
- Chromosome; extremely long, linear, ds DNA
- Plasmid; short circular or linear ds DNA
- Virus; single or ds DNA or RNA
- Transposable element; ds DNA within another DNA
- Mitochondrion or chloroplast (organelles); intermediate-length DNA, usually circular

CENTRAL DOGMA OF MOLECULAR BIOLOGY

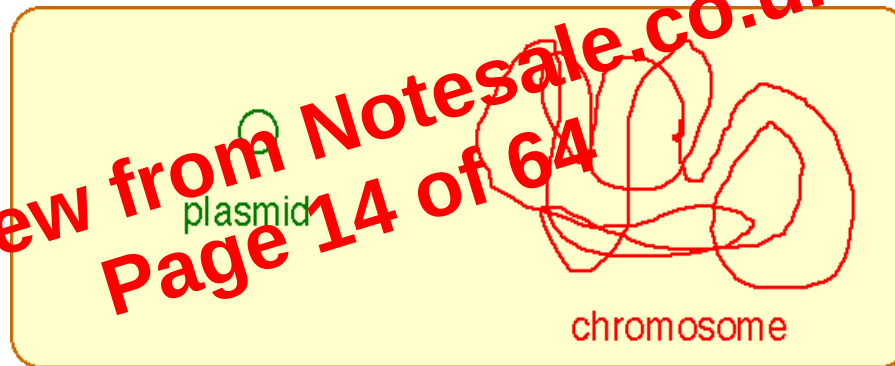
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Page 6 of 64



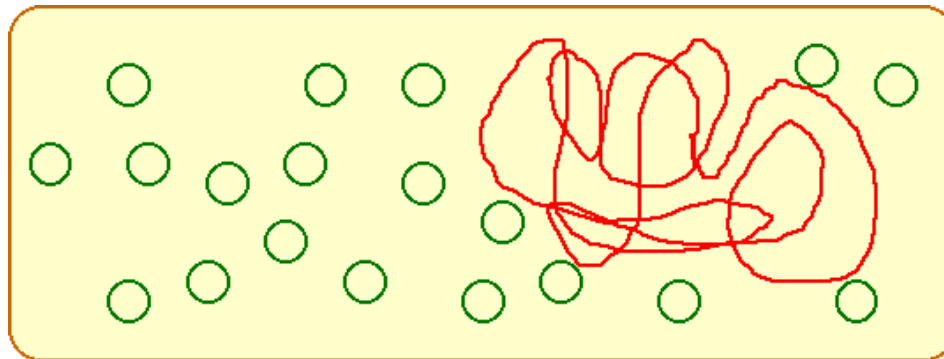
The flow of genetic information



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Page 14 of 64



Bacterial cells may contain extra-chromosomal DNA called plasmids. Plasmids are usually represented by small, circular DNA.



Some plasmids are present in multiple copies in the cell

TRANSPOSABLE ELEMENTS

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Page 24 of 64

- Genes: fixed positions/do not move sites
- Mobile DNA sequences=transposable genetic elements
 - Transposition=process by which pieces of DNA moves from one place to another in the genome (for variation/evolution)

- naked DNA/source of DNA
 - arise naturally (from dead, lysed bacteria)
 - generally large, ~20,000 nucleotide pairs long, might contain useful genes
 - integration into the host chromosome recipient's genome) (~500 base pairs)
 - homologous recombination
 - acquire new phenotype: transformed
 - transmission to progeny cells

NUMBER OF COTRANSFORMED GENES

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Page 38 of 64
- only a few genes (less than 15) in a single transformational event
 - impossible of taking up large piece of DNA
 - cell wall and plasma membrane: permeability barrier to large molecules

F mediated gene transfer

- an F factor can integrate into the host chromosome (as an episome : integrated state) at one of many sites
 - mediated by insertion (IS) elements
 - a cell which contains an integrated F factor: Hfr (high frequency recombination)
- Hfr conjugation
 - F factor mediates its self-transfer
 - difference: the attached chromosome may also follow into a recipient F⁻ cell

TRANSDUCTION

- involves the use of viruses that infect bacteria: bacteriophage (phage)
 - bacterial DNA is transferred by phage particles from a donor bacterium to a recipient cell
- two types of transducing phage
 - generalized transducing phage: (generalized transduction)
 - specialized transducing phage: (specialized transduction)

MECHANISM OF TRANSDUCTION

- depends on how phage grows in bacteria
 - the lysogeny cycle
 - the lytic cycle