F215: genes

Transcription

① DNA Helicase unzips DNA and breaks the hydrogen bonds; DNA acts as a template

② RNA polymerase binds to DNA

③ Moves along it from 5' end to 3' end

④ Free RNA nucleotides are bound onto the exposed bases according to the complementary base-pairing rule [A-U; C-G]; the bases are hydrogen bonded on

⑤ RNA peels off strand of DNA and passes out through the nuclear pore

Translation

⑥ MRNA binds to a ribosome; the first codon is always AUG

⑦ The ribosome reads it from 5' to 3' end

⑧ 2 codons are exposed at once

⑨ tRNA molecules have a complementary anticodon and carry a specific amino acid (tRNA binds by hydrogen bonding)

⑩ -AA is transported to a ribosome
-When 2 amino acids are adjacent, a peptide bond forms between them

⑪ Translation stops at a stop codon

How DNA codes for a protein

def gene = a length of DNA that codes for one or more polypeptides

① 1° structure determines the order of bases (one AA = 3 bases)

② which determines the specific order of amino acids

③ Thus then determines the projecting side groups

④ Leading to the 2° structure, involving H bonding (α helix or β pleated sheets)

⑤ which determines the 3° structure, bound by disulfide bonds; ionic bonds etc

⑥ This determines the specific 3D shape which is vital for function

⑦ If 3° structure altered, the shape will change & it can't function

Apoptosis

Programmed cell death

① The cytoplasm is broken down by enzymes and the cell becomes densely packed with organelles

② The nucleus breaks down and fragments. Chromatin condenses & the nuclear envelope breaks down

③ "Blebs" form at the cell membrane

④ Organelles move into blebs and form vesicles

⑤ Phagocytes digest the vesicles by phagocytosis

Benefits:

* Very fast
* NO toxic chemicals & hydrolytic enzymes are released with necrosis

Uses:

* controls limb & digit development
* destroys defective T lymphocytes in the immune system
* prevents all cells from dying in a viral attack

Hardy-Weinberg principle

A model to calculate allele fq in populations with dominant + recessive alleles

HOW?

eg. Take cystic fibrosis

To be a sufferer, you must be homozygous recessive.

One in 2000 suffer from this

Lets assign some symbols:

p = The frequency of the dominant allele, CF

q = the fq of the recessive allele cf

SO, the possible genotypes are:

	p	q
p	pp	pq
q	pq	qq

$= p^2 + pq + pq + q^2$

*since there is only either p (adominant allele) or q (a recessive allele)

$p + q = 1$

* since the recessive sufferers probability is

1/2000

so $q^2 = \frac{1}{2000} = 0.0005$, so $q = 0.022$ (square root it)

* Thus:

Since $p + q = 1$,

$p + 0.022 = 1$ $\quad p = 0.978$

* so the % of carriers are:

$2pq = 2 \times 0.978 \times 0.022 = 0.043 = 4.3\%$ of people