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BIOLOGY

THE CONTROL OF GENE EXPRESSION

Level & Board	AQA (A-LEVEL)
TOPIC:	DNA PROBE & GEL ELECTROPHORESIS
PAPER TYPE:	SOLUTION- 2
TOTAL QUESTIONS	6
TOTAL MARKS	30

DNA probe and Gel Electrophoresis - 2

1.

(a)

Cut DNA at same base sequence / recognition sequence

So get fragments with gene R / required gene.

(b)

Each has / they have a specific base sequence

That is complementary to allele r or R

(c)

Fragments L from parent rr, because all longer fragments / 195 base pair fragments

Fragments N from parent RR, because all shorter fragments / 135 base pair fragments

M from offspring heterozygous / Rr / have both 195 and 135 base pair fragments.

2.

(a)

Cells in mitosis chromosomes visible

So can see which chromosome DNA probe attached to.

3.

(a) For comparison with resistant flies / other two experiments / groups

To see death rate in non-resistant / to see effect of insecticide in non-resistant / normal flies.

(b)

PM must be involved because

Few resistant flies die without inhibitor

More inhibited flies die than resistant flies

PM inhibited flies die faster than resistant flies

Other factors must be involved because

Some resistant flies die

But with inhibitor still have greater resistance / die slower than non-resistant flies.

4.

(a) Reverse transcriptase

(b) Probe base sequence complementary to DNA of allele A / where A is and binds by forming base pairs / hydrogen bonds

So only this DNA labelled / has green dye / gives out green light

5.

(a) More probe binding / more cDNA / mRNA / more allele / gene A means more light

DNA (with A) doubles each PCR cycle

So light approximately doubles / curve steepens more and more each cycle / curve goes up exponentially / increases even faster

(b) G because

Heterozygous only has half the amount of probe for A attaching / only half the amount of DNA / allele A to bind to

So only produced about half the light / glow / intensity of H per cycle of PCR

6.

(a)

Carriers are heterozygous / have one normal copy and one mutant copy of gene / have one recessive allele / don't have the condition

Both have DNA that binds (about) half / 50% amount of probe (that non-carrier does

Probe binds to dominant / healthy allele so only one copy of exon in their DNA / have one copy of gene without exon / base sequence for probe to bind to

(b) Introns not translated / not in mRNA / (exons) code for amino acids / introns do not code for amino acids

Mutations of these (exons) affect amino acid sequences (that produce) faulty protein / change tertiary structure of protein

So important to know if parents' exons affected, rather than any other part of DNA / introns

(c) Restriction mapping / described

DNA / base sequencing of fragments / description / name of method

