# Edexcel (A) Biology A-level

## 6.1 to 6.4 + 6.10 - Forensics

Flashcards

Name 5 factors that can help determine time of death.

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- Stage of succession
- Level of decomposition
- Forensic entomology (types of insects in body)
- Extent of muscle contraction
- Body temperature

# How can extent of decomposition help determine how long a body has been dead?

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Bodies in similar environmental conditions show regular patterns of decay.

fresh → bloated → decaying → dry

# How can seral stage of succession help determine how long a body has been dead?

How can seral stage of succession help determine how long a body has been dead?

Predictable sequence of ecological succession. Different organisms colonise corpse at each stage e.g. necrophagous species first. Use a succession database.

# What is forensic entomology?

# What is forensic entomology?

Determines age of insects on a corpse using known life cycles. Measured in accumulated day degrees, which represents physiological time.

Alongside knowledge of seral stages, can accurately determine post mortem interval.

# How can body temperature help determine how long a body has been dead?

How can body temperature help determine how long a body has been dead?

Metabolic reactions stop, so body temperature decreases at a predictable rate.

Only applicable up to 24 hours after death since body reaches same temperature as surroundings.

# How can degree of muscle contraction help determine how long a body has been dead?

How can degree of muscle contraction help determine how long a body has been dead?

Observe the extent of rigor mortis, muscle stiffening which occurs after death.

Only applicable up to 36 hours after death.

# Explain the role of microorganisms in decomposition.

Explain the role of microorganisms in decomposition.

Fungi & bacteria use enzymes to hydrolyse dead organic matter into smaller molecules that they can use as respiratory substrates.

Process releases carbon dioxide & some methane. Recycles carbon into gas phase.

# How can DNA fragments be amplified *in vitro*?

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polymerase chain reaction (PCR)

# What does the reaction mixture in the first stage of PCR contain?

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- DNA fragment to be amplified.
- Complementary primers to bind to start of fragment.
- Free nucleotides to attach to exposed bases.
- DNA polymerase to join nucleotides on new strand.

# Summarise the process of using PCR.

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1. Heat to 95℃ to break H-bonds between DNA strands.
2. Cool to 54℃ to allow primers to bind.
3. Heat again to 70℃ to activate DNA polymerase & allow free nucleotides to anneal.
4. New DNA acts as template for next cycle.

# What can DNA profiling be used for?

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- Identifying individual organisms.
- Determining genetic relationships.

# Summarise the process of DNA profiling.

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1. Use restriction endonucleases to produce DNA fragments.
2. Use gel electrophoresis to separate fragments.
3. Label fragments with fluorescent or radioactive gene probes.
4. Perform Southern blotting to compare pattern of bands/satellites.

# How does gel electrophoresis work?

# How does gel electrophoresis work?

Place DNA fragments at one end of a slab of agarose gel. Apply an electric current so DNA fragments to move towards other end of the gel. Shorter fragments travel further. A stain is added to make pattern of bands visible.

Unique to every individual.

# What are satellites in DNA?

# What are satellites in DNA?

Repeated DNA sequences within introns also known as variable number tandem repeats (VNTRs).

More closely related individuals/species have more similar satellites. Can therefore be used to determine genetic relationships.

# What are gene probes?

# What are gene probes?

Short sequence of single-stranded DNA labelled with a fluorescent or radioactive tag.

Anneal to complementary base sequence on one section of a specific allele.

# What is the Southern blotting technique?

# What is the Southern blotting technique?

Alkaline buffer solution is poured over slab after gel electrophoresis.

Use a dry nylon filter to absorb fragments of stained DNA & produce visible ‘blots’.

# How can one gene result in the production of several different proteins?

How can one gene result in the production of several different proteins?

Post-transcriptional modification of pre-mRNA splices out all introns & some exons.

Spliceosomes rejoin the fragments. Exons can be joined in various sequences, producing different versions of functional mRNA.