Forensic Ecology and Environmental Science

Forensic Science · Answer Key · 12 Questions

1. Which specific stage of blow fly (Calliphoridae) development is most accurately predicted by the Accumulated Degree Hour (ADH) model in forensic entomology?

A) The transition from egg to first instar
B) The transition from second to third instar
C) The onset of pupariation
D) The emergence of the adult fly

2. What is the primary forensic application of 'diatom testing' in bodies recovered from aquatic environments?

A) Determining the exact time of death via cellular decay
B) Differentiating between ante-mortem and post-mortem submersion
C) Estimating the salinity of the water source
D) Identifying the specific species of fish present in the lungs

3. In palynological forensic analysis, why is the exine of pollen grains particularly useful as biological evidence?

A) It is composed of sporopollenin, one of the most chemically resistant organic compounds
B) It contains unique DNA sequences that change every 24 hours
C) It glows under infrared light for easy detection
D) It is highly soluble in common soil solvents

4. When using soil mineralogy for forensic provenance, which technique allows for the analysis of the elemental composition of individual soil particles without destroying the sample?

A) Gas Chromatography-Mass Spectrometry
B) X-ray Fluorescence (XRF) Spectroscopy
C) Atomic Absorption Spectroscopy
D) Liquid-Liquid Extraction

5. What phenomenon is observed in 'adipocere' formation, a soap-like substance formed from body fat in moist, anaerobic environments?

A) Rapid dehydration of the skin
B) The hydrolysis of body fats into saturated fatty acids
C) The total mineralization of skeletal remains
D) The immediate acceleration of insect colonization

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6. In forensic botany, what does the term 'dendrochronological dating' specifically measure to establish a post-mortem interval?

A) The rate of root penetration into a gravesite
B) The growth rings in trees affected by burial disturbances
C) The chemical leaching of leaves into the soil
D) The rate of moss colonization on human remains

7. Which coleopteran family is typically the first to arrive at a carcass after the initial blow fly colonization, often feeding on both the remains and the blow fly larvae?

A) Silphidae (Carrion beetles)
B) Dermestidae (Skin beetles)
C) Cleridae (Checkered beetles)
D) Staphylinidae (Rove beetles)

8. How does the 'Accumulated Degree Day' (ADD) differ from 'Accumulated Degree Hour' (ADH) in forensic entomology?

A) ADD is only used for aquatic insects
B) ADD uses a 24-hour daily average temperature rather than hourly increments
C) ADD is used to measure the growth of plant life only
D) ADD accounts for humidity levels in the soil

9. What is the forensic significance of the isotope ratios of Oxygen-18 and Deuterium in human tissues?

A) They indicate the total amount of protein consumed
B) They provide information about the geographic origin of water consumed by the individual
C) They identify the specific breed of livestock consumed
D) They determine the age of the individual at death

10. What distinguishes the feeding activity of Dermestidae (skin beetles) from other necrophagous insects in a forensic context?

A) They arrive only in the final stages of decomposition to consume dry skin and hair
B) They consume the brain matter exclusively
C) They are the primary pollinators found in forensic scenes
D) They are strictly nocturnal and never colonize during the day

11. In forensic soil analysis, what is the 'Gley' horizon characteristic of?

A) High oxygen saturation in topsoil
B) Constant water saturation and reduction of iron, often resulting in gray or blue-gray soil
C) Rapid evaporation of minerals in desert biomes
D) The presence of synthetic chemical pollutants

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12. Which environmental factor is most likely to cause 'fossilization' of footprints in soft substrates for forensic recovery?

A) Desiccation in an arid environment followed by burial

B) Constant exposure to acidic rainfall

C) Repeated cycles of freezing and thawing

D) The presence of high levels of alkaline volcanic ash

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