

## 2025 Bi H1 Q17

### Section: DNA and the Genome

### Topic: Gene Expression

#### Question Summary:

A plasmid was modified to contain a somatotropin gene, regulatory sequences, an origin of replication and a selectable marker gene. Genetically modified bacteria that took up this plasmid were resistant to ampicillin. You are asked which plasmid feature is responsible for this antibiotic resistance.

#### Worked Solution:

The plasmid contains several features:

- **Regulatory sequences:** control expression of the inserted gene; not involved in antibiotic resistance.
- **Somatotropin gene:** codes for human growth hormone; unrelated to antibiotic resistance.
- **Origin of replication:** allows plasmid duplication inside the bacterium; not responsible for resistance.
- **Selectable marker gene:** this typically encodes antibiotic resistance.

The bacteria were resistant to ampicillin, meaning the plasmid must carry a gene that provides this resistance. That is the function of a **selectable marker gene**.

**Final Answer: D (Selectable marker gene).**

#### Revision Tips:

- Selectable marker genes allow transformed cells to survive in the presence of antibiotics.
- The origin of replication ensures plasmid duplication but gives no survival advantage.
- Regulatory sequences control transcription of inserted genes but do not provide resistance.