



University of Jijel

Faculty of Natural Sciences and Life

Department of Cellular and Molecular Biology

TD 1 **Biotechnological applications of recombinant DNA (ABAR)**

Exercise 1

Choose the right response

- 1- In gel electrophoresis of DNA, the different bands in the final gel form because the DNA molecules
 - a- are from different organisms
 - b- have different lengths
 - c- have different nucleotide compositions
 - d- have different genes
- 2- In the reproductive cloning of an animal, the genome of the cloned individual comes from
 - a- a sperm cell
 - b- an egg cell
 - c- any gamete cell
 - d- a body cell
- 3- What carries a gene from one organism into a bacteria cell?
 - a- a plasmid
 - b- an electrophoresis gel
 - c- a restriction enzyme
 - d- polymerase chain reaction
- 4- What is a genetically modified organism (GMO)?
 - a- a plant with certain genes removed
 - b- an organism with an artificially altered genome
 - c- a hybrid organism
 - d- any agricultural organism produced by breeding or biotechnology
- 5- What is a key difference between Polymerase Chain Reaction (PCR) and cloning?
 - a- PCR is used for DNA amplification, while cloning involves the insertion of genes into host organisms.
 - b- PCR and cloning are synonymous terms and can be used interchangeably.
 - c- PCR is used for gene sequencing, while cloning is used for DNA replication.
 - d- PCR and cloning both involve the extraction of DNA from cells.
- 6- What is the primary purpose of an expression vector in molecular biology?
 - a- To store DNA sequences for long-term preservation.
 - b- To amplify genes for research purposes.
 - c- To express and produce proteins in host organisms.
 - d- To study the physical characteristics of DNA.
- 7- Which of the following is a common selectable marker used in expression vectors?

- a- A fluorescent protein.
 - b- An antibiotic resistance gene.
 - c- A DNA polymerase enzyme.
 - d- A ribosomal RNA molecule.
- 8- What is the function of a promoter sequence in an expression vector?
- a- To terminate gene expression.
 - b- To mark the starting point of DNA replication.
 - c- To initiate transcription of the inserted gene.
 - d- To regulate the vector's antibiotic resistance.
- 9- In the context of expression vectors, what is meant by "inducible expression"?
- a- The vector is used to clone genes.
 - b- Gene expression can be turned on or off using specific signals or conditions.
 - c- The vector can only express genes in mammalian cells.
 - d- The vector is highly resistant to antibiotics.
- 10- Which host organisms can be used with expression vectors for protein production?
- a- Only bacteria.
 - b- Only yeast.
 - c- Bacteria, yeast, mammalian cells, and more.
 - d- None of the above.
- 11- What is the role of a polyadenylation signal (poly-A signal) in an expression vector?
- a- To stabilize the mRNA produced by the gene.
 - b- To mark the start of gene transcription.
 - c- To enhance antibiotic resistance.
 - d- To degrade unwanted DNA sequences.
- 12- Which of the following is NOT typically found in an expression vector?
- a- A promoter sequence.
 - b- A replication origin for yeast.
 - c- A selectable marker.
 - d- A polyadenylation signal.
- 13- What is the purpose of a fusion tag in an expression vector?
- a- To prevent the expression of the inserted gene.
 - b- To enhance the antibiotic resistance of the vector.
 - c- To increase the vector's size.
 - d- To facilitate purification and detection of the expressed protein.

Exercise 2

- 1- Make a diagrammatic presentation showing the difference between expression vectors and cloning vectors.
- 2- Complete this table:

Expression Vector	Host	Gene of Interest	Selectable Marker	Promoter	Protein Product

pET-28a		GFP		T7 promoter	
	Saccharomyces cerevisiae	α -amylase			
		Insulin	Neomycin resistance		
pBAD30	E. coli	β -galactosidase			
	Pichia pastoris		Zeocin resistance	AOX1 promoter	Human Growth Hormone

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