# Молекулярная биология 2 / Биотехнологии 2

ВЕСНА 2013. Программа по биоинформатике
Промежуточный зачет

ФИО

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## Multiple Choice Questions
## 2 points each

**1. Ans.**
Restriction enzymes:

A) act at the membrane to restrict the passage of certain molecules into the cell.
B) are highly specialized ribonucleases that degrade mRNA soon after its synthesis.
C) are sequence-specific DNA endonucleases.
D) are very specific proteases that cleave peptides at only certain sequences.
E) catalyze the addition of a certain amino acid to a specific tRNA.

**2. Ans.**
The biological role of restriction enzymes is to:

A) aid recombinant DNA research.
B) degrade foreign DNA that enters a bacterium.
C) make bacteria resistant to antibiotics.
D) restrict the damage to DNA by ultraviolet light.
E) restrict the size of DNA in certain bacteria.

**3. Ans.**
The size of the DNA region specifically recognized by type II restriction enzymes is typically:

A) 4 to 6 base pairs.
B) 10 to 15 base pairs.
C) 50 to 60 base pairs.
D) 200 to 300 base pairs.
E) about the size of an average gene.

**4. Ans.**
Which of the following statements about restriction enzymes is *false*?

A) Many make staggered (off-center) cuts within their recognition sequences.
B) Some cut DNA to generate blunt ends.
C) They are part of a bacterial defense system in which foreign DNA is cleaved.
D) They cleave and ligate DNA.
E) They cleave DNA only at recognition sequences specific to a given restriction enzyme.

**5. Ans.**
Certain restriction enzymes produce cohesive (sticky) ends. This means that they:

A) cut both DNA strands at the same base pair.
B) cut in regions of high GC content, leaving ends that can form more hydrogen bonds than ends of high AT content.
C) make a staggered double-strand cut, leaving ends with a few nucleotides of single-stranded DNA protruding.
D) make ends that can anneal to cohesive ends generated by any other restriction enzyme.
E) stick tightly to the ends of the DNA they have cut.

**6. Ans.**
Which of the following statements regarding plasmid cloning vectors is correct?

A) Circular plasmids do not require an origin of replication to be propagated in *E. coli*.
B) Foreign DNA fragments up to 45,000 base pairs can be cloned in a typical plasmid.
C) Plasmids do not need to contain genes that confer resistance to antibiotics.
D) Plasmid vectors must carry strong promoters for inserted gene fragments.
E) The copy number of plasmids may vary from a few to several hundred.

**7. Ans:**
A convenient cloning vector with which to introduce foreign DNA into *E. coli* is a(n):

A) *E. coli* chromosome.
B) messenger RNA.
C) plasmid.
D) yeast "ARS" sequence.
E) yeast transposable element.

**8. Ans:**
In genetic engineering (for example, in gene therapy), in vitro packaging is used to:

A) cut a desired region out of the host bacterium's chromosome.
B) ensure that genetically engineered bacteria are not accidentally released into the environment.
C) incorporate recombinant DNA into viral particles.
D) place an antibiotic resistance gene in a plasmid.
E) splice a desired gene into a plasmid.

**9. Ans:**
Which of the following does *not* apply to the construction or use of a DNA library?

A) Determining the location of a particular DNA sequence in a DNA library requires a suitable hybridization probe.
B) Genomic libraries are better for expressing gene products than cDNA libraries.
C) Many segments of DNA from a cellular genome are cloned.
D) Specialized DNA libraries can be made by cloning DNA copies of mRNAs.
E) The DNA copies of mRNA found in a cDNA library are made by reverse transcriptase.

**10. Ans:**
The PCR reaction mixture does *not* include:

A) all four deoxynucleoside triphosphates.
B) DNA containing the sequence to be amplified.
C) DNA ligase.
D) heat-stable DNA polymerase.
E) oligonucleotide primer(s).

**11. Ans:**
Which of the following statements about the polymerase chain reaction (PCR) is *false*?

A) DNA amplified by PCR can be cloned.
B) DNA is amplified at many points within a cellular genome.
C) Newly synthesized DNA must be heat-denatured before the next round of DNA synthesis begins.
D) The boundaries of the amplified DNA segment are determined by the synthetic oligonucleotides used to prime DNA synthesis.
E) The technique is sufficiently sensitive that DNA sequences can be amplified from a single animal or human hair.

**12. Ans:**
RFLP is a:

A) bacteriophage vector for cloning DNA.
B) genetic disease.
C) plasmid vector for cloning DNA.
D) protein.
E) variation in DNA base sequence.

**13. Ans:**
Current estimates indicate that humans have closer to about _____ genes.

A) 3,000
B) 10,000
C) 30,000
D) 100,000
E) 300,000

**14. Ans:**
Current estimates indicate that approximately_____ % of the human genome is translated into protein.

A) less than 0.5%
B) roughly 1.5%
C) roughly 10%
D) roughly 25%
E) more than 50%

**15. Ans:**
Rank the following organisms in order from smallest genome (number of base pairs of DNA) to largest genome.

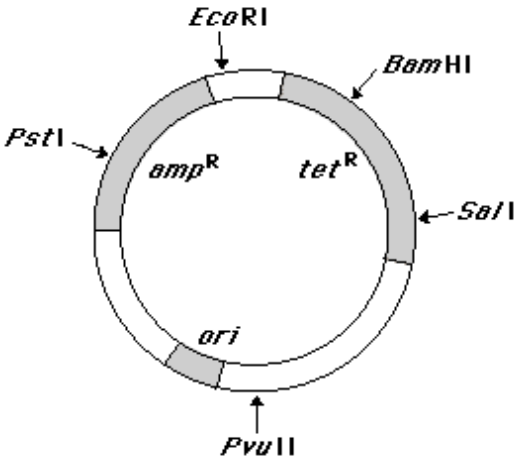
A) Human, fruit fly, *E. coli* bacterium
B) *E. coli* bacterium, human, fruit fly
C) *E. coli* bacterium, fruit fly, human
D) fruit fly, *E. coli* bacterium, human
E) fruit fly, human, *E. coli* bacterium

**16. Ans:**
Which one of the following analytical techniques is the best to study many genes at once?

A) DNA microarray analysis
B) Western blotting
C) Southern blotting
D) RFLP analysis
E) PCR

**Other questions (6 points each)**

**17. Match each feature of the plasmid pBR322 (at left) with *one* appropriate description presented (at right)**

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|---|---|
| ____ *amp*$^R$ sequence | (a) permits selection of bacteria containing the plasmid |
| ____ *ori* sequence | (b) permits selection of recombinant plasmids |
| ____ *tet*$^R$ sequence | (c) origin of replication |
| ____ *EcoRI* sequence | (d) cleavage of the plasmid here does not affect antibiotic sequence resistance genes |

18. Почему ДНК полимераза для ПЦР должна быть термостабильной?

19. Кратко опишите как происходит клонирование организма?